WITTENSTEIN

Products 2009

Low backlash planetary gearheads

Servo right-angle gearheads

Mechanical systems

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Contents

Our guiding principle - the belief that our systems and products make life easier for our customers and their businesses more successful and efficient. We are continually setting standards and applying advanced technology to give our customers a competitive edge on the market.

WITTENSTEIN

The **group**

Specialized fields united in one company.

WITTENSTEIN AG is active in seven innovative fields of business:
Servo gearheads, servo drive systems, medical technology, miniature servo units, innovative toothing technology, powerful actuator systems and intelligent electronic solutions. Each company in the WITTENSTEIN group strives to make advances in their respective field and develop specialized solutions to perfection. The companies that use the WITTENSTEIN name are committed to paving the way for greater freedom of innovation in the future.

WITTENSTEIN | alpha

Drives, controls and positional accuracy are areas that require maximum precision. Products manufactured by WITTENSTEIN alpha GmbH are setting benchmarks worldwide in the fields of mechanical engineering and drive technology. From low backlash planetary gearheads, servo right-angle gearheads and complete drive units to the comprehensive cymex® engineering software package and expert technical consultation: WITTENSTEIN alpha GmbH has redefined the meaning of precision, an essential benchmark and the most important attribute of our products and services.

WITTENSTEIN | electronics

WITTENSTEIN electronics GmbH develops, manufactures and distributes **electronics and software components** for drive technology. Products and services designed for complex mechatronic systems are capable of working under extreme ambient conditions and characterized by their outstanding reliability.

WITTENSTEIN | motion control

Integration plays an critical role here and is a decisive factor in increasing power density and dynamics. WITTENSTEIN motion control GmbH develops **functional mechatronic systems** from the WITTENSTEIN group's strong base of core products.
These electromechanical systems prove their worth through such key characteristics as control, precision, dynamics, reliability and durability.

WITTENSTEIN | cyber motor

Dynamics that accelerate progress. Outstanding power and dynamics, minimal weight and maximum reliability characterize the servo motors from WITTENSTEIN cyber motor GmbH. Customized motors from WITTENSTEIN guarantee increased productivity and higher endurance. From intense research and development into special materials, WITTENSTEIN motors are highly capable under extreme conditions such as high vacuum, radioactive, extreme temperature changes.

WITTENSTEIN | intens

Intelligence fascinates, inspires and adds that extra dimension. Innovative medical technology manufactured by WITTENSTEIN intens GmbH, which **focuses mainly on intelligent implants,** achieves all of the above. FITBONE® is currently the only fully implantable intramedullary nail for bone extension that can be controlled and adjusted via electromechanical traction. Intelligence is crucial to every step of the development process, right up to the end product.

WITTENSTEIN | bastian

Those who subscribe to individuality are forever confronted with new challenges. Whether in the design, manufacture, research or testing phase – when developing innovative gearing technology, WITTENSTEIN bastian GmbH always considers the unique requirements of the different application areas. This is how **individual solutions for motor racing, aerospace and robotics applications** are produced. WITTENSTEIN bastian GmbH redefines the concept of individuality on a daily basis: because the company is open to innovation and has the courage to explore unknown territory.

WITTENSTEIN | aerospace & simulation

Maximum effect, minimum weight – the efficiency of each component plays a vital role in the aerospace industry. The powerful electromechanical actuator systems manufactured by WITTENSTEIN aerospace & simulation GmbH represent both high quality and unique compactness. These highly efficient systems are used **in the new Airbus A380, prototypes of the Phoenix space plane and both military and commercial simulators.** Efficiency has adopted a unique meaning: Maximum performance combined with outstanding freedom of innovation.

Value based

Understanding partners.
Communicating processes.
Achieving objectives.

Our systems and products are aimed at making your life easier for a more successful business.

More than 1400 employees at more than 60 locations. Always there where you need us. Our vision of a successful future together.

High performance

Journey to the center of the Earth. Voyage of discovery in space. The hunt for the Formula 1 record. WITTENSTEIN drive technology is predominantly used in applications with special requirements. In the most diverse branches of industry. At locations near and far. Under the most extreme conditions. WITTENSTEIN is setting benchmarks worldwide. With outstanding performance and individual solutions.

WITTENSTEIN –
Products that know no limits

WITTENSTEIN worldwide

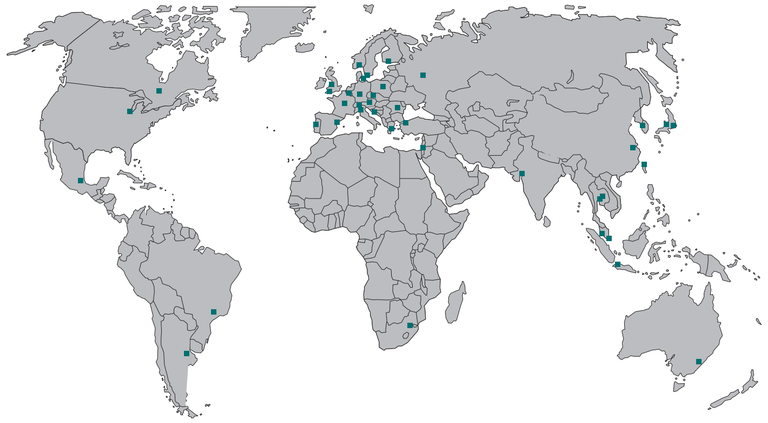


Photo Phoenix: EADS Astrium

WITTENSTEIN – Products that know no limits. High precision drive systems for diverse branches of industry: Drive technology · Electronics · Machine tools · Manufacturing systems · Robotics, automation, handling · Textile, printing and paper machines · Laser, glass and wood processing machines · Food and packaging machines Pneumatics · Semiconductor · Linear technology · Aerospace · Extreme ambient conditions (such as high temperatures, ultra-high vacuums) · Crude oil exploration · Medical technology · Pharmaceutical · Motor racing · Automotive and tire · Optical media · Vehicle technology · Defense technology.

Argentina · Australia · Austria · Belgium · Brazil
Canada · China · Croatia · Czech Republic
Denmark · Egypt · Finland · France · Germany
Greece · Hungary · India · Israel · Italy · Japan
Korea Republic · Luxembourg · Malaysia · Mexico
Norway · Poland · Portugal · Puerto Rico · Romania
Russia · Singapore · South Africa · Spain · Sweden
Switzerland · Taiwan · Thailand · The Netherlands
Turkey · United Kingdom · United States of America

Network

Five continents.
Three oceans.
More than six billion people.

The WITTENSTEIN group is active in more than 40 countries. An international network with unlimited communication and interaction.

For applications requiring compactness, power and precision.

When developing products for wood processing technology, printing technology or robotics, automation and handling technology, we always strive to fulfill demanding requirements and think beyond our limits. With new ideas and innovative systems that give us fresh impetus to promote forward thinking and develop revolutionary concepts.

WITTENSTEIN | alpha

WITTENSTEIN alpha – Your partner in excellence

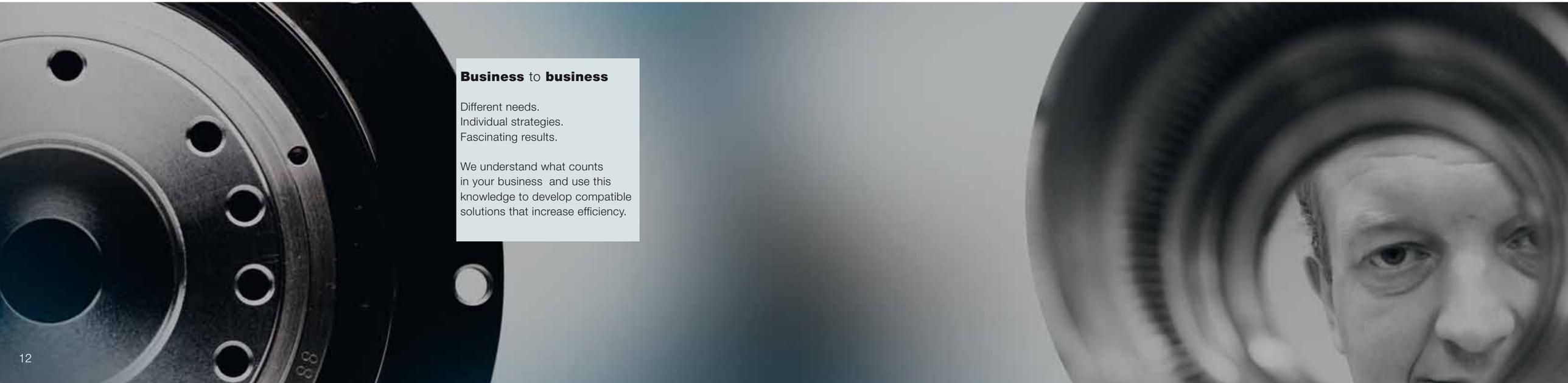
Machine tools and manufacturing systems
Maximum precision, process stability and productivity thanks to durable mechanical system solutions virtually free of backlash and torsion used in feed-, swivel and auxiliary axles.

Food and packaging machines
A range of gearheads designed for all types of axis used in packaging technology - including washdown models - for maximum operating efficiency, machine flexibility and cycle speeds.

Wood processing machines
Mechanical systems such as gearheads with pinion/rack, on-site consultation and a comprehensive knowledge of engineering form an impressive package that guarantees a high-quality end product with maximum efficiency.

Printing and paper machines
Innovative gearhead products that offer high constant speeds, seamless synchronization and permanent precision – the perfect solution for high-quality printing processes and other continuous applications. Available as an option: Integrated sensors for monitoring web tension and similar parameters.

Robotics, automation and handling technology
A wide range of servo gearheads and mechanical drive systems, from low-cost to high-end products for all types of robot and auxiliary axles such as drive axles and tool manipulators.



Business to **business**

Different needs.
Individual strategies.
Fascinating results.

We understand what counts in your business and use this knowledge to develop compatible solutions that increase efficiency.

Customer service – Our excellence through service.

Customer service in WITTENSTEIN stands for **quicker, more reliable and more capable service to customers.** „WITTENSTEIN is committed to being a world class global partner.“ This critical aspect of our corporate philosophy underlies our knowledge of service.

speedline® saves time – Your gearhead ready for delivery in only 24 hours

Would you like to be more flexible, implement your ideas more quickly and be able to make snap decisions? Then speedline® is the right service for you. We will assemble a standard series SP+, TP+ and LP+ within 24 or 48 hours ex works at attractive conditions – customized to fulfill your individual requirements.

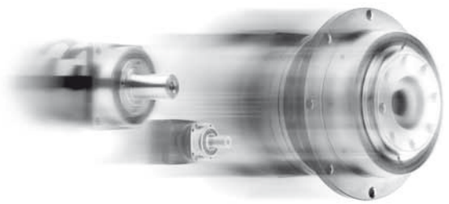
Like all WITTENSTEIN alpha products, you can rely on speedline® to carry out a 100% quality control check on all orders placed. A reliable logistics concept guarantees a prompt delivery to your doorstep.

Your gearhead will be ready within 24 or 48 hours ex works.

speedline®
by WITTENSTEIN alpha

Web service – Online access:

You can now access all the relevant information directly online via the web service. For example:
- CAD files in different formats
- installation videos
- operating instructions
- motor installation visuals



Service made to **measure**

We believe that a made-to-measure service should always include the following:
- Repairs/overhauls
- Spare part deliveries
- On-site deployment
- Condition inspections

We also offer the following services:
- Material and microscopic analyses
- Oil analyses
- Vibration measurement
- Synchronization measurement
- Advice on sealing technology and tribology

cymex Statistics

All statistics relating to experiences made in the field have been documented over the years. cymex Statistics now enables you to evaluate these statistics with a view to developing quality assurance measures for the future.

This knowledge can also be used for:
- lifecycle cost analyses
- MTTFF (meantime to first failure)
- reliability calculations
- preventative maintenance measures
- verification of gearhead designs

24h hotline/Service Center

Technical support from experienced professionals available when you need it.

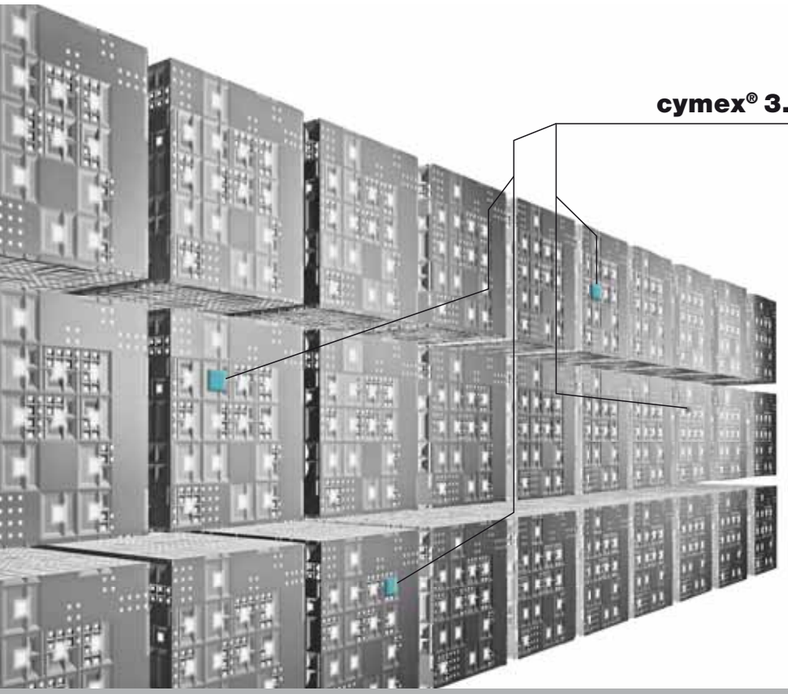
speedline® team

You need your gear reducer in the next 24 to 48 hours?

Contact your local sales office.
Please see the back cover for contact information.

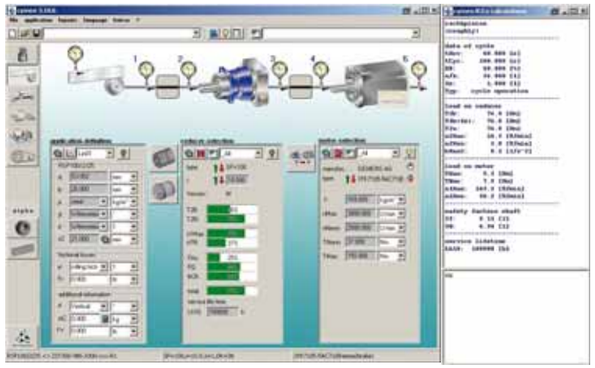
cymex® 3.1 – Software for drive technology

cymex® enables the simple dimensioning and design of complete drive trains (application + motor + gearhead). Standard predefined applications make precise calculations so much easier.
Consideration for all major influencing factors and specific customer parameters guarantee the perfect design for your drive system.



cymex® 3.1 fast – simple – reliable

If you're looking for the perfect drive system, benefit from the vast experience of cymex®. Users ranging from experienced to novice rely on this simple software to design gearboxes with unparalleled speed and accuracy.



cyber **m**otion **ex**plorer

Beyond the limits of the catalog

cymex® 3.1 provides access to a wealth of defined values not available in our product catalogs. The software incorporates decades of WITTENSTEIN AG design experience, extending your design options and achieving a 40% increase in gearhead utilization.

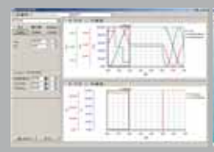
The benefits for you:
- greater accuracy during the design process
- maximum power output
- uncovering hidden potential
- possible use of smaller gearheads to reduce costs

Established features

- Standard predefined applications
- cymex® profiler for creating simple or complex motion and load profiles
- Functions for importing motion profiles from SAM, Excel, ASCII
- Application data and technical data documented in Microsoft Word
- Offline CAD generator: 3D gearhead files including all attached components compatible with the selected motor
- Database containing all current WITTENSTEIN alpha products
- Largest global database with more than 7000 motors offered by all current manufacturers

Seminars

Our WITTENSTEIN academy offers customers and prospective buyers the opportunity to attend seminars on drive technology or training courses on cymex® design software. The content of the training is fully adaptable to fulfill your specific requirements.



cymex® profiler

CAD generator

Motor load

The modular **system**

An unbeatable team.
Drive systems by WITTENSTEIN alpha.

A flexible, variable system consisting of several innovative components: State-of-the-art servo motor and servo gearhead technology, linear systems as well as racks and pinions that achieve unrivalled precision. Unique calculations and simulations allow you to maximize system efficiency.

1+1=1

Drive systems by WITTENSTEIN alpha incorporate different innovations, are designed in line with the modular principle and offer a host of advantages as a result. Maximized speeds and improved positioning accuracy increase productivity and the quality of the product. Effective integration for easier assembly and use.

WITTENSTEIN alpha **products**

Low backlash planetary gearheads
alpheno®
TP+
SP+
LP+/LPB+
alphira®

Servo right-angle gearheads
TK+/TPK+
SK+/SPK+
HG+
LK+/LPK+
V-DRIVE®

Mechanical systems
Rack and pinion systems
alpha IQ – Intelligent gearheads
Couplings
Belt pulleys
Additional mechanical drive elements

Gearhead selection overview

		Low backlash planetary gearheads							
									
Products		**alpheno®**	**TP⁺**	**TP⁺ High Torque**	**SP⁺**	**SP⁺ High Speed**	**LP⁺**	**LPB⁺**	**alphira®**
Catalog page		24	28		66		112		124
Ratio	min. i =		4	22	3	3	3	3	5
	max. i =		100	220	100	100	100	10	100
Output type									
Smooth output shaft					●	●	●		
Grooved output shaft					●	●	●		●
Output shaft with involute toothing					●	●			
Shaft mounted Mounted via shrink disc					●	●			
Output flange			●	●				●	
Torsional backlash									
≤ 1 arcmin			●	●	●				
≤ 2 arcmin			●		●	●			
≤ 4 arcmin			●	●	●	●			
≤ 6 arcmin					●	●			
≤ 10 arcmin						●	●	●	
≤ 15 arcmin							●	●	
≤ 20 arcmin									●
≤ 25 arcmin									●
Drive type									
Motor attachment version			●	●	●	●	●	●	●
Drive shaft			●		●				
Optional									
With belt pulley								●	
With pinion and rack			●	●	●	●	●		●
With coupling			●		●	●	●		●
Washdown Please contact WITTENSTEIN alpha			●	●	●	●			
Food-grade grease Please contact WITTENSTEIN alpha			●	●	●	●	●	●	

Your individual solution – Please contact us

		Servo right-angle gearheads									
											
Products		**TK⁺**	**TPK⁺**	**SK⁺**	**SPK⁺**	**HG⁺**	**LK⁺**	**LPK⁺**	**VDT**	**VDH**	**VDS**
Catalog page		136		156		176	190		212		
Ratio	min. i =	3	12	3	12	3	1	3	4	4	4
	max. i =	100	1000	100	1000	100	1	100	40	40	40
Output type											
Smooth output shaft				●	●			●			●
Smooth output shaft, back		●	●	●	●	●					
Grooved output shaft				●	●		●	●			●
Grooved output shaft, back		●	●	●	●	●					
Output shaft with involute toothing				●	●						●
Output flange		●	●						●		
Hollow shaft interface, Mounted via shrink disc		●				●			●	●	
Hollow shaft interface, back, Mounted via shrink disc		●	●	●	●	●				●	
Hollow shaft flange		●							●		
Shaft mounted Mounted via shrink disc					●						
Closed cover, back		●	●	●	●	●					
Torsional backlash											
≤ 2 arcmin			●		●						
≤ 4 arcmin		●	●	●	●	●			●	●	●
≤ 5 arcmin		●	●	●	●	●					
≤ 15 arcmin							●	●			
Drive type											
Motor attachment version		●	●	●	●	●	●	●	●	●	●
Optional											
With pinion and rack		●	●	●	●		●	●	●		●
With coupling		●	●	●	●		●	●	●		●
Shrink disc						●				●	
Washdown Please contact WITTENSTEIN alpha		●	●	●	●						
Food-grade grease Please contact WITTENSTEIN alpha		●	●	●	●	●	●	●	●	●	●

Low backlash planetary gearheads by WITTENSTEIN alpha are sure to win over the hearts and minds of engineers and designers who place emphasis on efficiency, productivity and process stability.

WITTENSTEIN

alpheno® | **TP+** | **SP+** | **LP+** | **alphira®**

Low backlash planetary gearheads

Maximum power density

And the torques?
Although the previous series achieved outstanding results, we managed to increase the torques by up to 40%.
Raising the limits – Typical of WITTENSTEIN alpha!

Versatile installation

In whatever position you install your + gearhead, the gearhead always contains the same quantity of oil.

The gearheads are so flexible, you can install them vertically, horizontally or with the output facing upwards or downwards.

Simple motor installation

Safe, faultless motor installation is possible in a single working step. The WITTENSTEIN alpha-patented motor attachment is also available with integrated thermal length compensation as an option.

Superior running thanks to the helical teeth

The SP+ and TP+ gearheads “whisper”.
Compared to the classic straight-toothed SP and TP, helical-toothed + gearheads are 6 dB(A) quieter during operation. And what a difference 64 instead of 70 decibels makes to added value. You will hardly notice the vibrations made by gearheads from the + series because they run so smoothly.

Maximum positioning accuracy

SP and TP represented compact precision. Now the SP+ and TP+ represent maximum compact precision because we have managed to further reduce the torsional play compared with the previous series to less than one angular minute to enable you to significantly increase the positioning accuracy in your application.

World-class lifespan

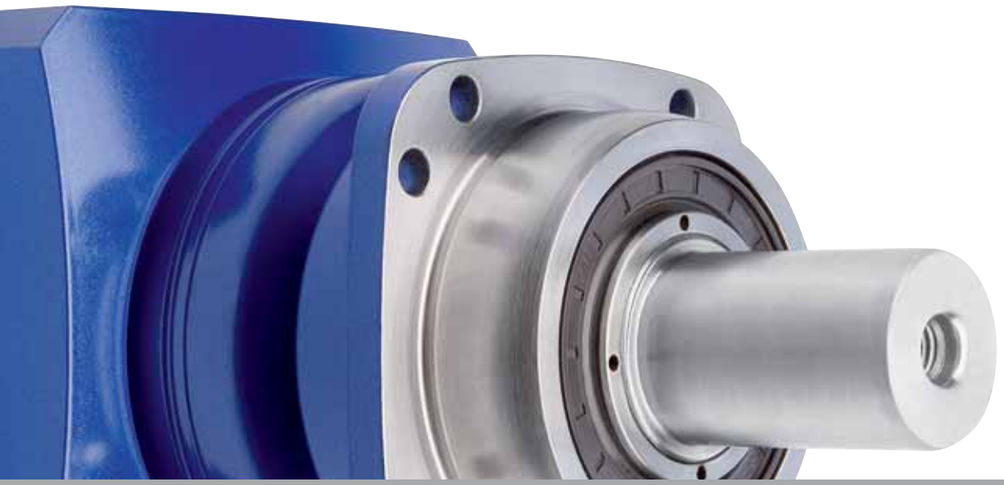
The seal rings on the + gearhead series were specially developed and the material and geometry are both optimized to ensure an extremely long lifespan!

alpheno® – Rendez-vous with the future

Anyone setting their sights on the future should always have the right partner on their side. Form a mutual partnership with us that promotes innovation and development. We develop advanced drive technology solutions together with our customers to help them rise to the challenge of a constantly changing market. An alliance of mutual success is top of our agenda.

alpheno® individual

Are you searching for a solution specially adapted to your needs? We enter into close collaboration with all our customers to develop personalized solutions and produce the perfect design for your drive applications.



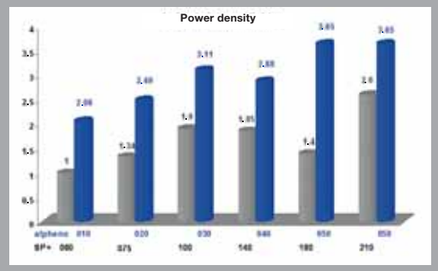
alpheno®

Specifications \ Version	**alpheno®**		
	+	**++**	**+++**
Positioning accuracy			
Rigidity			
Smooth-running			
Speed capacity			
Power density			
Max. axial/radial forces			

alpheno® – Customized innovation

- if you require an even more compact drive
- if you wish to enhance the performance of your machine
- if you require a specific solution

We offer you compact solutions and improved performance.



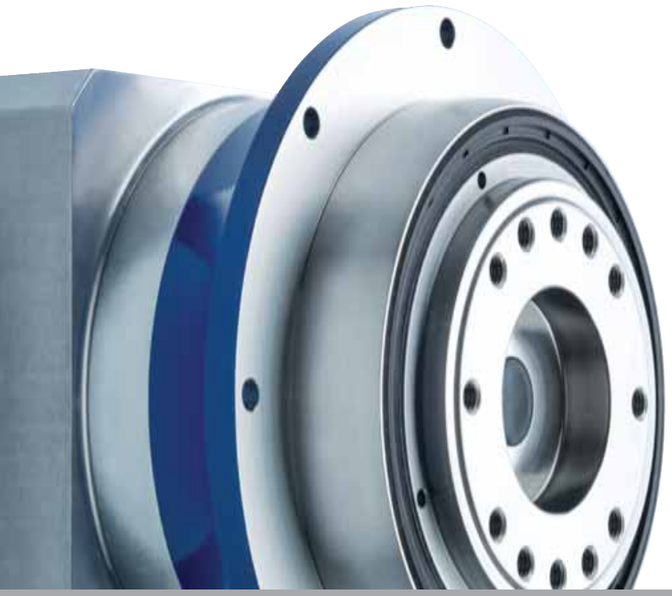
Power density comparison: Industrial standard with alpheno®

alpheno® is quality.

We define quality as a philosophy. An integrated QM system that incorporates state-of-the-art measuring and testing methods assures the quality of our products.

TP+ – The new generation

Top performer among compact planetary gearheads with drive flange

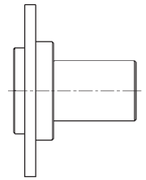


MF version
Designed for:
- Highly dynamic applications
- Greater positioning accuracy
- Space-saving designs

MA version (HIGH TORQUE)
Designed for:
- Maximum power density
- Maximum positioning accuracy
- High torsional rigidity
- Demanding safety requirements

With sensors

See our website and our separate flyer for more information about our washdown solutions



Shaft output

Coupling: BCT

Rack / Pinion

TP+

Specifications \ Version	TP+ MF/MA		
	+	++	+++
Positioning accuracy		MF	
			MA
Rigidity		MF	
			MA
Smooth-running			
Speed capacity			
Power density		MF	
			MA
Max. axial/radial forces			

Options

With sensors (see page 264)
Washdown version
Food-grade grease

Accessories

Rack / Pinion (see page 236)
Coupling: BCT (see page 282)
Shaft output

Also available as a motor/gearhead unit

			1-stage			
Ratio [a]	i		**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	60	62	60	–
		in.lb	531	549	531	–
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	55	55	55	35
		in.lb	487	487	487	310
Nominal output torque (with n_{2N})	T_{2N}	Nm	28	28	28	18
		in.lb	248	248	248	159
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	100	100	100	100
		in.lb	885	885	885	885
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	3300	3300	4000	4000
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	0.95	0.80	0.60	0.45
		in.lb	8.41	7.08	5.31	3.98
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2			
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	12	12	11	8
		in.lb/ arcmin	106	106	97	71
Tilting rigidity	C_{2K}	Nm/ arcmin	–			
		in.lb/ arcmin				
Max. axial force [d]	F_{2AMax}	N	1630			
		lb_f	367			
Max. tilting moment	M_{2KMax}	Nm	110			
		in.lb	974			
Efficiency at full load	η	%	97			
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000			
Weight incl. standard adapter plate	m	kg	1.4			
		lb_m	3.1			
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 58			
Max. permitted housing temperature		°C	+90			
		F	194			
Ambient temperature		°C	0 to +40			
		F	32 to 104			
Lubrication			Lubricated for life			
Paint			Blue RAL 5002			
Direction of rotation			Motor and gearhead same direction			
Protection class			IP 65			
Moment of inertia (relates to the drive) — B 11	J_1	kgcm²	0.17	0.14	0.11	0.09
		10^{-3} in.lb.s²	0.15	0.12	0.10	0.08
Moment of inertia (relates to the drive) — C 14	J_1	kgcm²	0.25	0.21	0.18	0.17
		10^{-3} in.lb.s²	0.22	0.19	0.16	0.15
Moment of inertia (relates to the drive) — E 19	J_1	kgcm²	0.57	0.54	0.51	0.49
		10^{-3} in.lb.s²	0.50	0.47	0.45	0.43

Clamping hub diameter [mm]

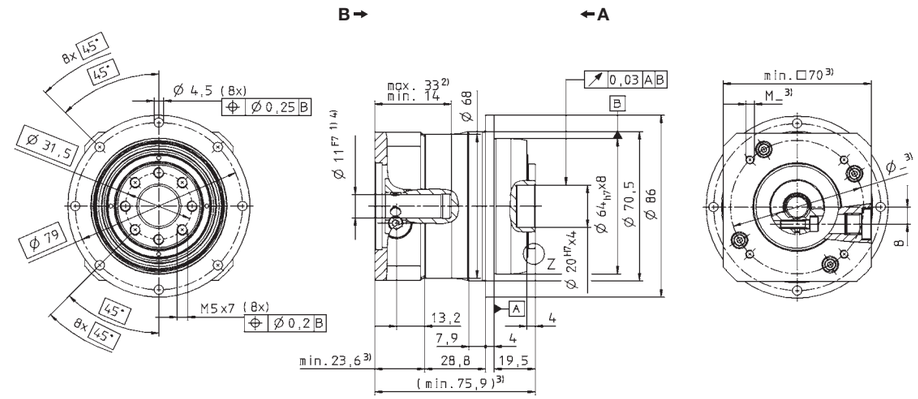
Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 14 mm
[d] Refers to center of the output shaft or flange

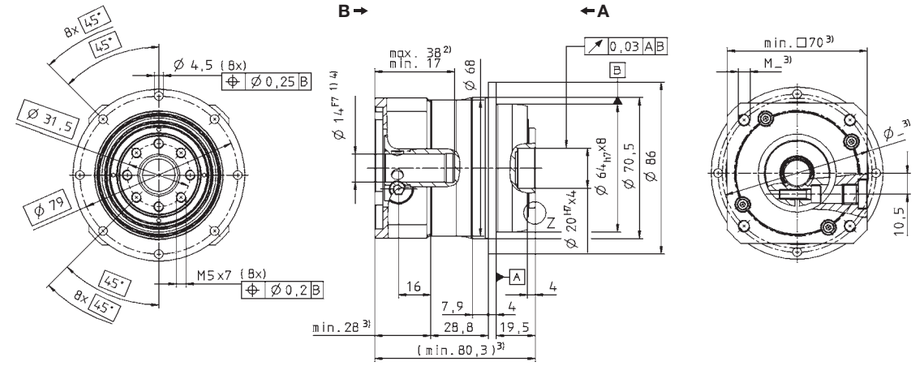
Motor shaft diameter [mm]

View A

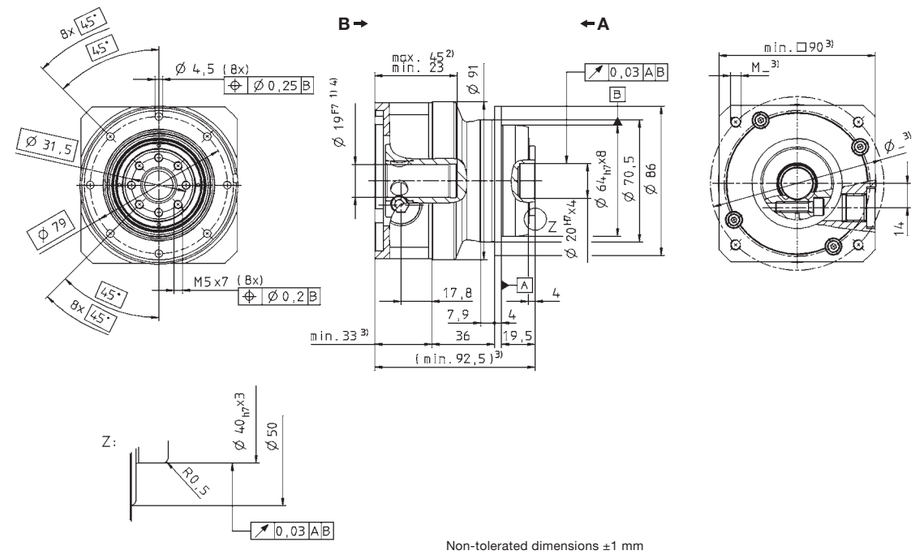
up to 11 [4] (B) clamping hub diameter



up to 14 [4] (C) clamping hub diameter



up to 19 [4] (E) clamping hub diameter



Non-tolerated dimensions ±1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 004 2-stage

			2-stage												
Ratio [a]	i		**16**	**20**	**21**	**25**	**28**	**31**	**35**	**40**	**50**	**61**	**70**	**91**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	60	60	–	62	60	–	62	62	62	–	60	–	–
		in.lb	531	531	–	549	531	–	549	549	549	–	531	–	–
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	55	55	40	55	55	40	55	55	55	45	55	32	35
		in.lb	487	487	354	487	487	354	487	487	487	398	487	283	310
Nominal output torque (with n_{2N})	T_{2N}	Nm	40	40	30	40	40	30	40	40	40	30	40	15	18
		in.lb	354	354	266	354	354	266	354	354	354	266	354	133	159
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	100	100	100	100	100	100	100	100	100	100	100	100	100
		in.lb	885	885	885	885	885	885	885	885	885	885	885	885	885
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4800	5500	5500	5500	5500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	0.55	0.45	0.45	0.45	0.35	0.35	0.30	0.25	0.25	0.20	0.20	0.20	0.20
		in.lb	4.87	3.98	3.98	3.98	3.10	3.10	2.66	2.21	2.21	1.77	1.77	1.77	1.77
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2												
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	12	12	10	12	12	9	12	11	12	9	11	7	8
		in.lb/ arcmin	106	106	89	106	106	80	106	97	106	80	97	62	71
Tilting rigidity	C_{2K}	Nm/ arcmin	–												
		in.lb/ arcmin													
Max. axial force [d]	F_{2AMax}	N	1630												
		lb_f	367												
Max. tilting moment	M_{2KMax}	Nm	110												
		in.lb	974												
Efficiency at full load	η	%	94												
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000												
Weight incl. standard adapter plate	m	kg	1.5												
		lb_m	3.3												
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 58												
Max. permitted housing temperature		°C	+90												
		F	194												
Ambient temperature		°C	0 to +40												
		F	32 to 104												
Lubrication			Lubricated for life												
Paint			Blue RAL 5002												
Direction of rotation			Motor and gearhead same direction												
Protection class			IP 65												
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	B	11	J_1	kgcm²	0.078	0.070	0.074	0.068	0.062	0.072	0.061	0.051	0.057	0.058	0.056	0.057	0.056
				10^{-3} in.lb.s²	0.069	0.062	0.066	0.060	0.054	0.064	0.054	0.051	0.050	0.051	0.050	0.051	0.050
	C	14	J_1	kgcm²	0.17	0.17	0.17	0.16	0.16	0.17	0.16	0.15	0.15	0.15	0.15	0.15	0.15
				10^{-3} in.lb.s²	0.15	0.15	0.15	0.14	0.14	0.15	0.14	0.14	0.13	0.13	0.13	0.13	0.13

Reduced mass moments of inertia available on request.

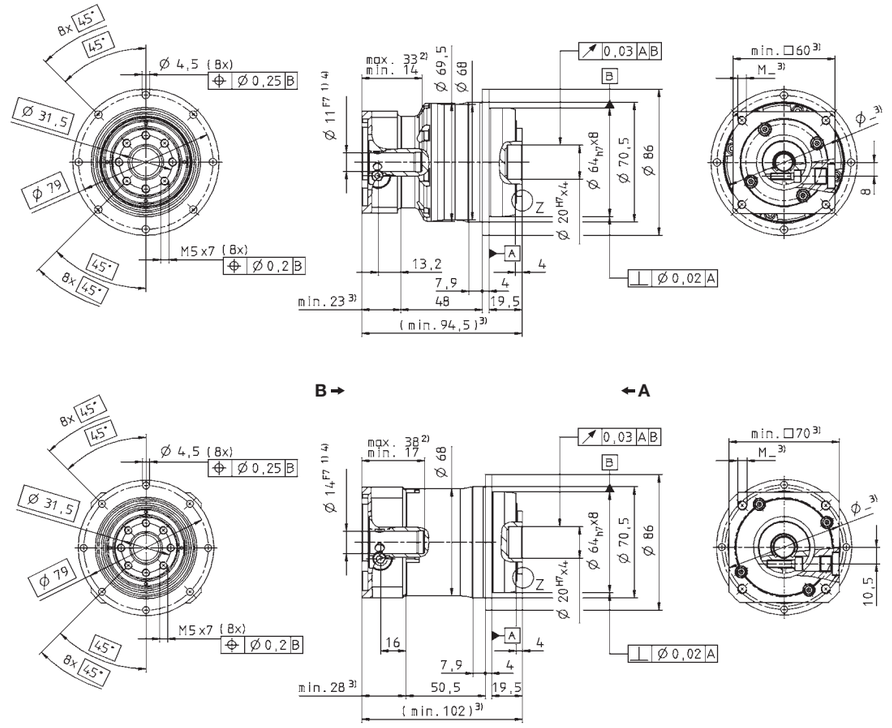
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 11 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

up to 11 [4] (B) clamping hub diameter

up to 14 [4] (C) clamping hub diameter

View A



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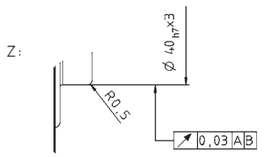


Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 010 1-stage

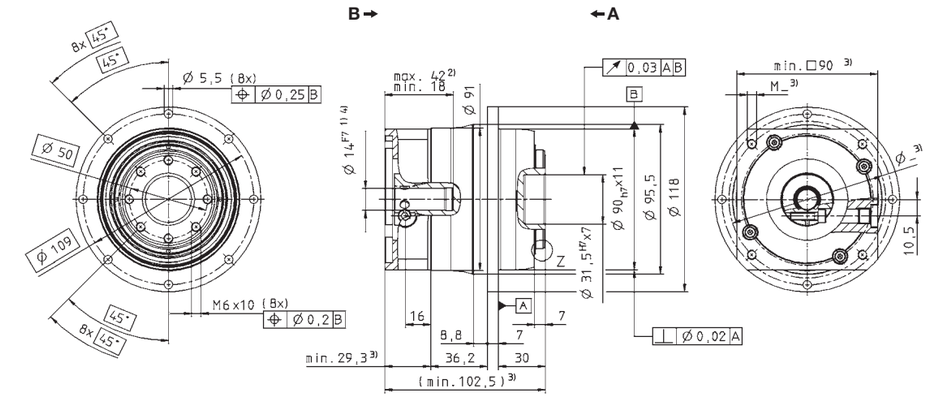
			1-stage			
Ratio [a]	i		**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	150	162	162	–
		in.lb	1328	1434	1434	–
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	143	143	143	105
		in.lb	1266	1266	1266	929
Nominal output torque (with n_{2N})	T_{2N}	Nm	75	75	75	60
		in.lb	664	664	664	531
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	250	250	250	250
		in.lb	2213	2213	2213	2213
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	2600	2900	3100	3100
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	1.6	1.3	1.0	0.7
		in.lb	14.2	11.5	8.85	6.20
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	32	33	30	23
		in.lb/ arcmin	283	292	266	204
Tilting rigidity	C_{2K}	Nm/ arcmin	225			
		in.lb/ arcmin	1991			
Max. axial force [d]	F_{2AMax}	N	2150			
		lb_f	484			
Max. tilting moment	M_{2KMax}	Nm	270			
		in.lb	2390			
Efficiency at full load	η	%	97			
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000			
Weight incl. standard adapter plate	m	kg	3.8			
		lb_m	8.4			
Operating noise (with i=10 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 59			
Max. permitted housing temperature		°C	+90			
		F	194			
Ambient temperature		°C	0 to +40			
		F	32 to 104			
Lubrication			Lubricated for life			
Paint			Blue RAL 5002			
Direction of rotation			Motor and gearhead same direction			
Protection class			IP 65			
Moment of inertia (relates to the drive)	C	14	J_1	kgcm²	0.78	0.62	0.48	0.40
				10⁻³ in.lb.s²	0.69	0.55	0.42	0.35
Clamping hub diameter [mm]	E	19	J_1	kgcm²	0.95	0.79	0.64	0.57
				10⁻³ in.lb.s²	0.84	0.70	0.57	0.50
	G	24	J_1	kgcm²	2.32	2.16	2.02	1.94
				10⁻³ in.lb.s²	2.05	1.91	1.78	1.72

Reduced mass moments of inertia available on request.

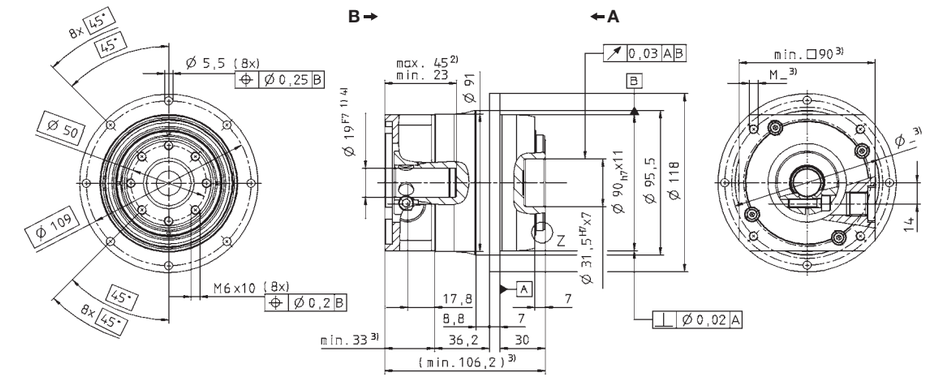
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

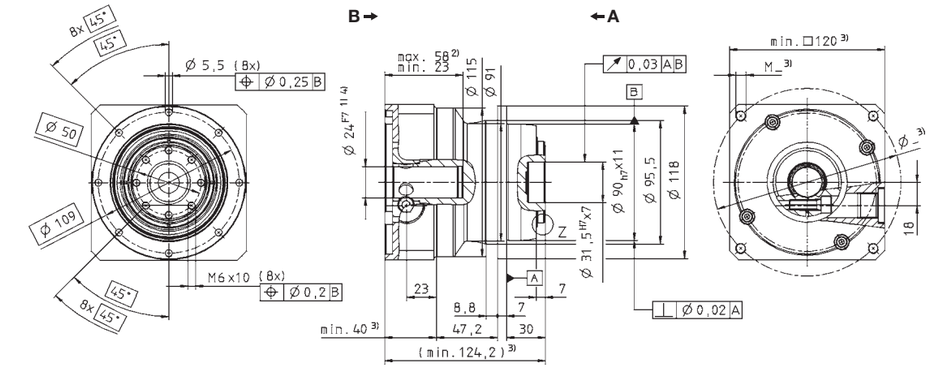
up to 14 [4] (C) clamping hub diameter



up to 19 [4] (E) clamping hub diameter



up to 24 [4] (G) clamping hub diameter



Non-tolerated dimensions ±1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 010 2-stage

			2-stage												
Ratio a)	*i*		**16**	**20**	**21**	**25**	**28**	**31**	**35**	**40**	**50**	**61**	**70**	**91**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	162	162	–	162	162	–	162	–	162	–	162	–	–
		in.lb	1434	1434	–	1434	1434	–	1434	–	1434	–	1434	–	–
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	143	143	100	143	143	110	143	140	143	110	143	80	105
		in.lb	1266	1266	885	1266	1266	974	1266	1239	1266	974	1266	708	929
Nominal output torque (with n_{1N})	T_{2N}	Nm	90	90	80	90	90	70	90	80	90	70	90	35	60
		in.lb	797	797	708	797	797	620	797	708	797	620	797	310	531
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	250	250	250	250	250	250	250	250	250	250	250	250	250
		in.lb	2213	2213	2213	2213	2213	2213	2213	2213	2213	2213	2213	2213	2213
Nominal input speed (with T_{2N} and 20°C ambient temperature) b)	n_{1N}	rpm	3500	3500	3500	3500	3500	3500	3500	3500	3800	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) c)	T_{012}	Nm	0.90	0.75	0.70	0.65	0.55	0.50	0.50	0.40	0.35	0.35	0.35	0.30	0.30
		in.lb	7.97	6.64	6.20	5.75	4.87	4.43	4.43	3.54	3.10	3.10	3.10	2.66	2.66
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1												
Torsional rigidity c)	C_{t12}	Nm/ arcmin	32	32	26	32	31	24	32	30	30	24	28	21	22
		in.lb/ arcmin	283	283	230	283	274	212	283	266	266	212	248	186	195
Tilting rigidity	C_{2K}	Nm/ arcmin	225												
		in.lb/ arcmin	1991												
Max. axial force d)	F_{2AMax}	N	2150												
		lb_f	484												
Max. tilting moment	M_{2KMax}	Nm	270												
		in.lb	2390												
Efficiency at full load	η	%	94												
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000												
Weight incl. standard adapter plate	*m*	kg	3.6												
		lb_m	8.0												
Operating noise (with *i*=100 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 59												
Max. permitted housing temperature		°C	+90												
		F	194												
Ambient temperature		°C	0 to +40												
		F	32 to 104												
Lubrication			Lubricated for life												
Paint			Blue RAL 5002												
Direction of rotation			Motor and gearhead same direction												
Protection class			IP 65												
Moment of inertia (relates to the drive) – Clamping hub diameter [mm] B 11	J_1	$kgcm^2$	0.17	0.14	0.15	0.13	0.11	0.13	0.10	0.09	0.09	0.09	0.09	0.09	0.09
		10^{-3} in.lb.s²	0.15	0.12	0.13	0.12	0.10	0.12	0.09	0.08	0.08	0.08	0.08	0.08	0.08
C 14	J_1	$kgcm^2$	0.24	0.21	0.22	0.20	0.18	0.21	0.18	0.17	0.17	0.17	0.16	0.16	0.16
		10^{-3} in.lb.s²	0.21	0.19	0.19	0.19	0.16	0.18	0.16	0.15	0.15	0.15	0.14	0.15	0.14
E 19	J_1	$kgcm^2$	0.56	0.53	0.55	0.53	0.51	0.53	0.50	0.49	0.49	0.49	0.49	0.49	0.49
		10^{-3} in.lb.s²	0.50	0.47	0.49	0.47	0.45	0.47	0.44	0.43	0.43	0.43	0.43	0.43	0.43

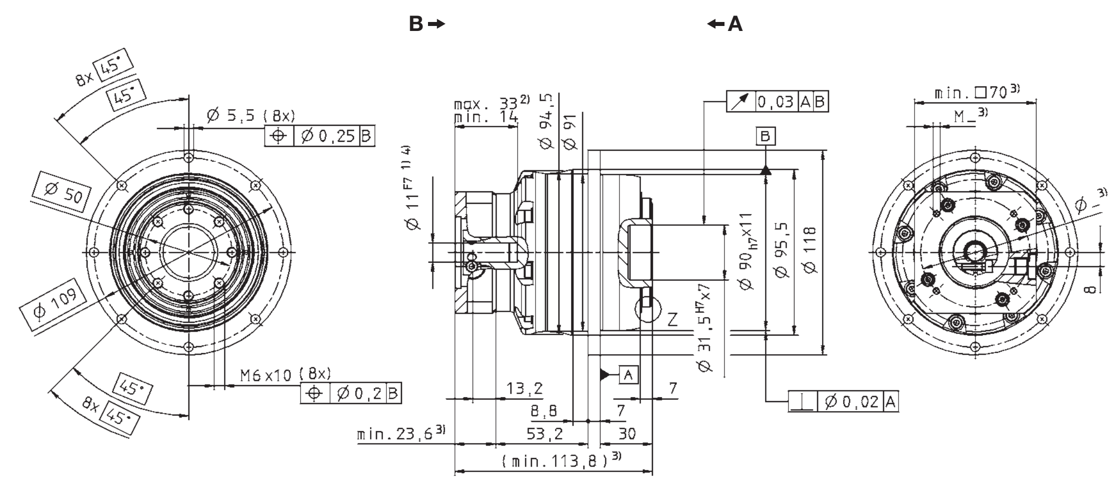
Reduced mass moments of inertia available on request.

a) Other ratios available on request
b) For higher ambient temperatures, please reduce input speed
c) Valid for clamping hub diameter of 14 mm
d) Refers to center of the output shaft or flange

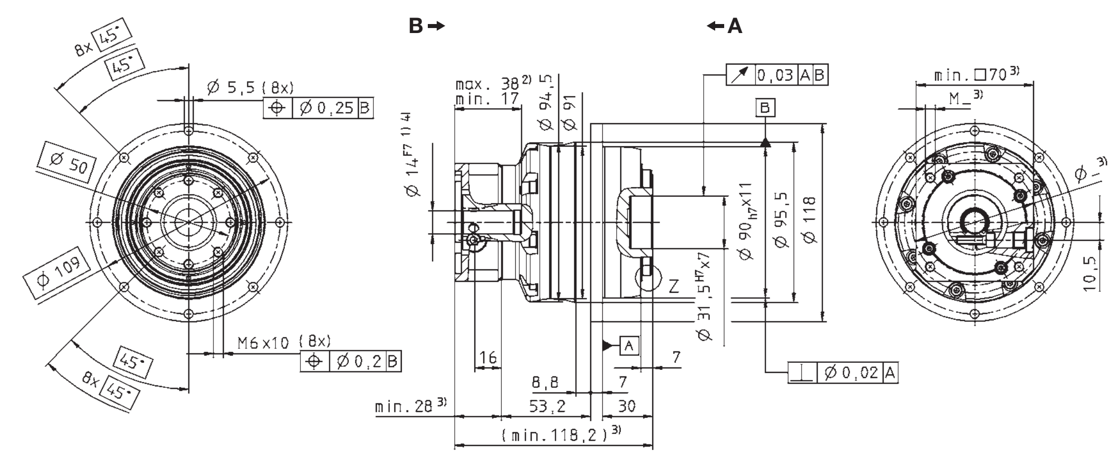
View A | View B

Motor shaft diameter [mm]

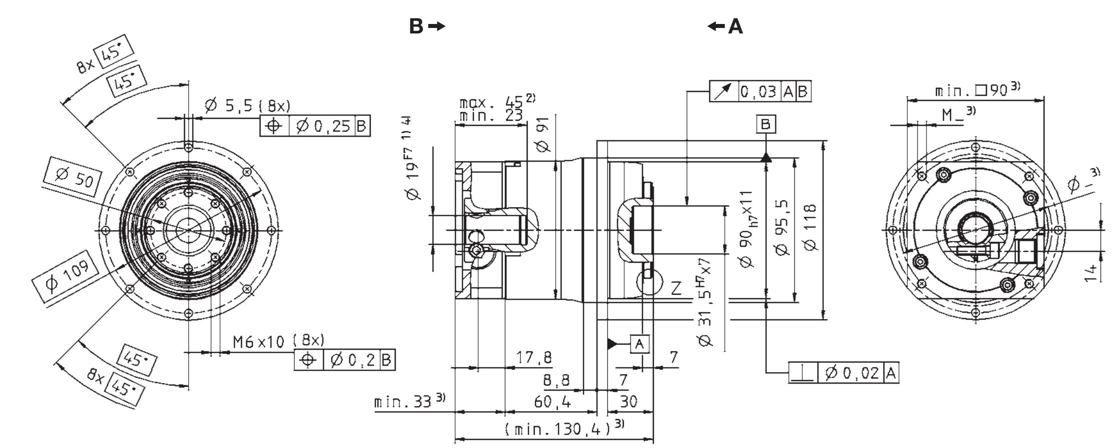
up to 11 4) (B) clamping hub diameter

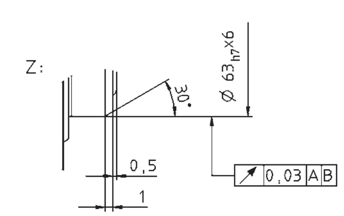


up to 14 4) (C) clamping hub diameter



up to 19 4) (E) clamping hub diameter





Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

			2-stage				3-stage			
Ratio [a]	i		**22**	**27.5**	**38.5**	**55**	**88**	**110**	**154**	**220**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	230	230	230	230	230	230	230	230
		in.lb	2036	2036	2036	2036	2036	2036	2036	2036
Nominal output torque (with n_{1N})	T_{2N}	Nm	150	150	180	110	180	180	180	180
		in.lb	1328	1328	1593	974	1593	1593	1593	1593
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	525	525	525	525	525	525	525	525
		in.lb	4646	4646	4646	4646	4646	4646	4646	4646
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	4000	4000	4000	4000	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	0.42	–	–	–	–	0.23	–	–
		in.lb	3.72					2.04		
Max. torsional backlash	j_t	arcmin	≤ 1				≤ 1			
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	43	43	43	42	42	42	42	42
		in.lb/ arcmin	381	381	381	372	372	372	372	372
Tilting rigidity	C_{2K}	Nm/ arcmin	225				225			
		in.lb/ arcmin	1991				1991			
Max. axial force [d]	F_{2AMax}	N	2150				2150			
		lb_f	484				484			
Max. tilting moment	M_{2KMax}	Nm	400				400			
		in.lb	3540				3540			
Efficiency at full load	η	%	94				92			
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				> 20000			
Weight incl. standard adapter plate	m	kg	3.2				3.6			
		lb_m	7.1				8.0			
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 60				≤ 60			
Max. permitted housing temperature		°C	+90							
		F	194							
Ambient temperature		°C	0 to +40							
		F	32 to 104							
Lubrication			Lubricated for life							
Paint			Blue RAL 5002							
Direction of rotation			Motor and gearhead same direction							
Protection class			IP 65							
Moment of inertia (relates to the drive)	C 14	J_1	kgcm²	0.21	0.18	0.16	0.14	0.16	0.15	0.14	0.13
			10^{-3} in.lb.s²	0.19	0.16	0.14	0.12	0.14	0.13	0.12	0.12
Clamping hub diameter [mm]	E 19	J_1	kgcm²	0.52	0.50	0.47	0.46	–	–	–	–
			10^{-3} in.lb.s²	0.46	0.44	0.42	0.41				

Reduced mass moments of inertia available on request.

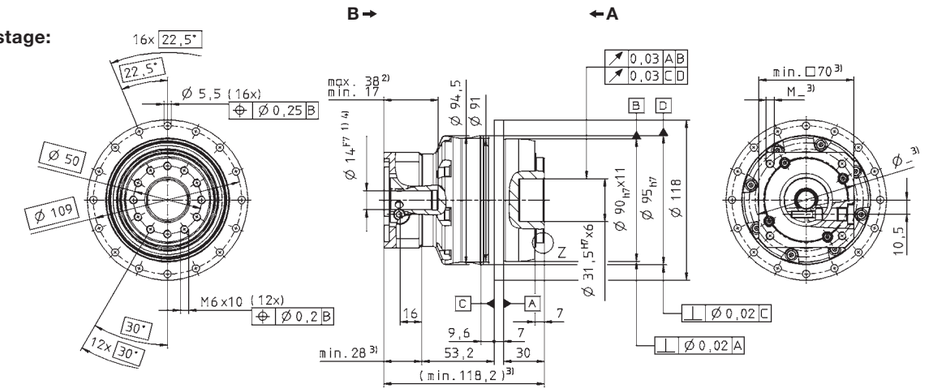
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 14 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

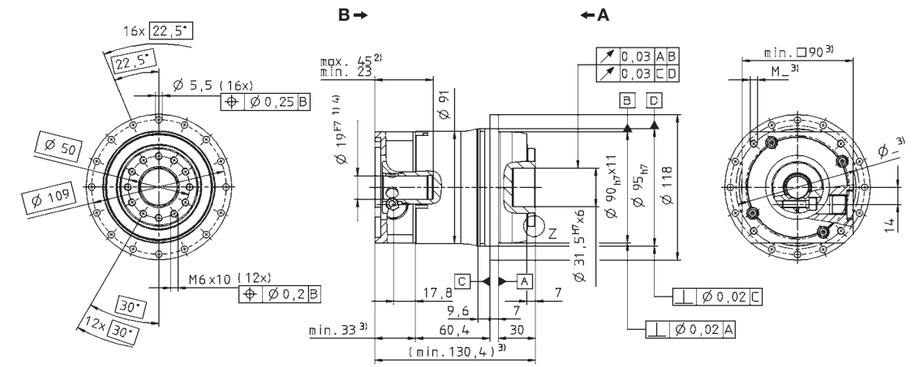
View A

up to 14 [4] (C) clamping hub diameter

2-stage:

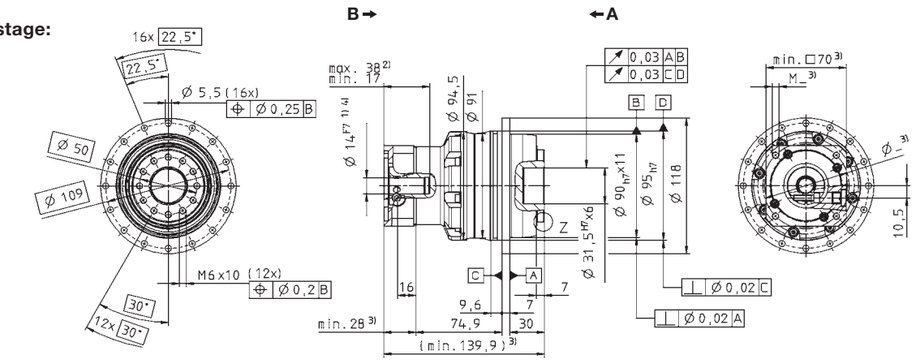


up to 19 [4] (E) clamping hub diameter



3-stage:

up to 14 [4] (C) clamping hub diameter



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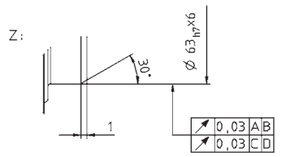


Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 025 1-stage

			1-stage			
Ratio [a]	i		**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	390	420	350	275
		in.lb	3452	3717	3098	2434
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	350	380	330	265
		in.lb	3098	3363	2921	2345
Nominal output torque (with n_{2N})	T_{2N}	Nm	170	170	170	120
		in.lb	1505	1505	1505	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	625	625	625	625
		in.lb	5531	5531	5531	5531
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	2300	2500	2500	2500
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	3.3	2.7	2.0	1.4
		in.lb	29.2	23.9	17.7	12.4
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	80	86	76	62
		in.lb/ arcmin	708	761	673	549
Tilting rigidity	C_{2K}	Nm/ arcmin	550			
		in.lb/ arcmin	4868			
Max. axial force [d]	F_{2AMax}	N	4150			
		lb_f	934			
Max. tilting moment	M_{2KMax}	Nm	440			
		in.lb	3894			
Efficiency at full load	η	%	97			
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000			
Weight incl. standard adapter plate	m	kg	6.5			
		lb_m	14.4			
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 64			
Max. permitted housing temperature		°C	+90			
		F	194			
Ambient temperature		°C	0 to +40			
		F	32 to 104			
Lubrication			Lubricated for life			
Paint			Blue RAL 5002			
Direction of rotation			Motor and gearhead same direction			
Protection class			IP 65			
Moment of inertia (relates to the drive)	E 19	J_1	kgcm²	2.59	2.11	1.69	1.45
			10^{-3} in.lb.s²	2.29	1.87	1.50	1.28
Clamping hub diameter [mm]	G 24	J_1	kgcm²	3.28	2.80	2.38	2.14
			10^{-3} in.lb.s²	2.90	2.48	2.11	1.89
	H 28	J_1	kgcm²	2.76	2.36	1.98	1.74
			10^{-3} in.lb.s²	2.44	2.09	1.75	1.54
	K 38	J_1	kgcm²	10.3	9.87	9.45	9.21
			10^{-3} in.lb.s²	9.11	8.73	8.36	8.15

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 24 and 28 mm
[d] Refers to center of the output shaft or flange

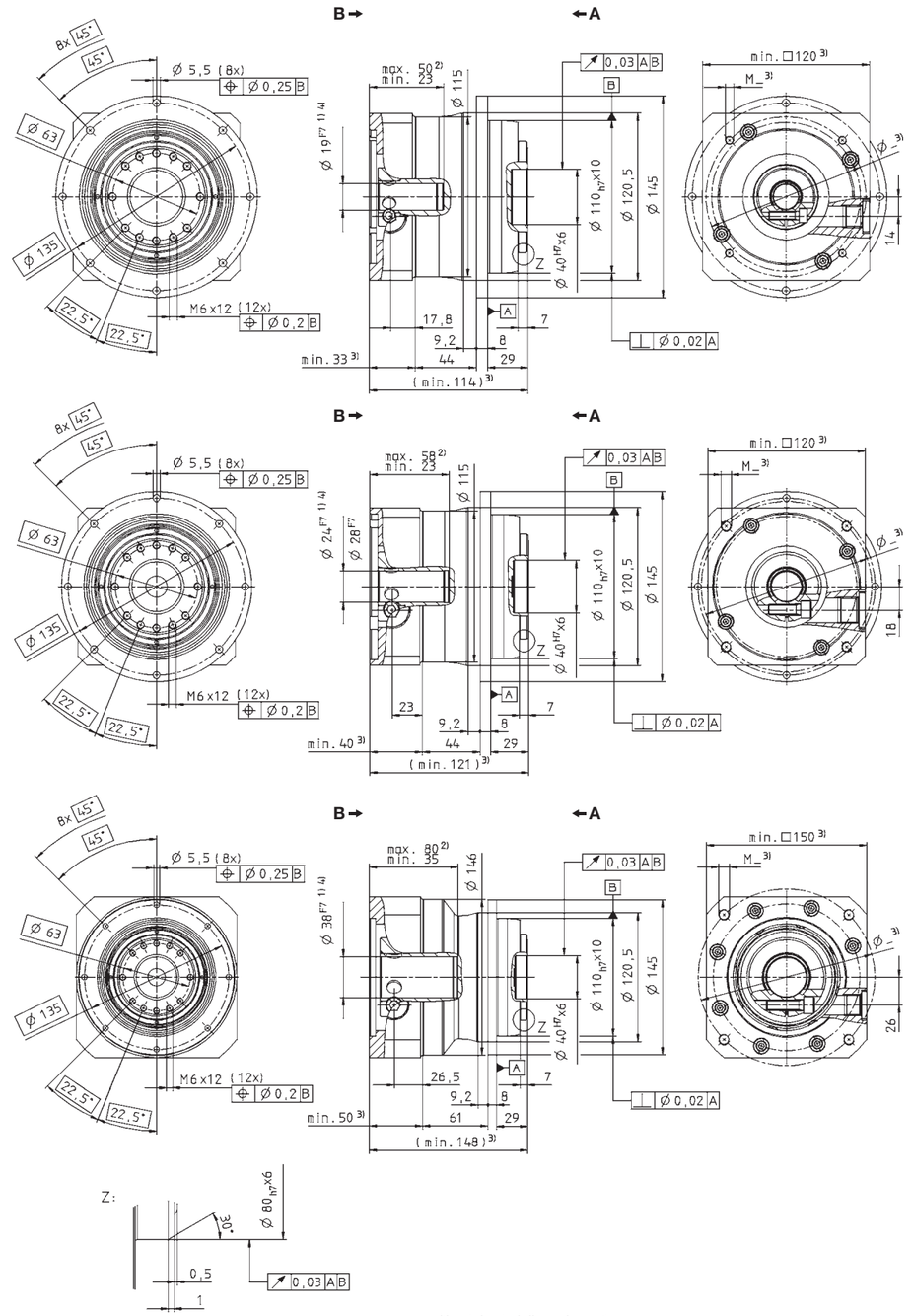
Motor shaft diameter [mm]

up to 19 [4] (E) clamping hub diameter

up to 24/28 [4] (G/H) clamping hub diameter

up to 38 [4] (K) clamping hub diameter

View A



Non-tolerated dimensions ±1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

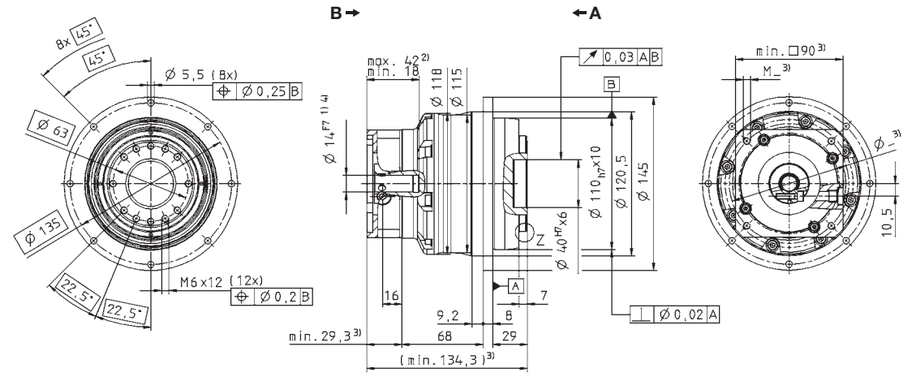
			2-stage												
Ratio [a]	i		**16**	**20**	**21**	**25**	**28**	**31**	**35**	**40**	**50**	**61**	**70**	**91**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	390	390	–	420	390	–	420	390	420	–	350	–	275
		in.lb	3452	3452	–	3717	3452	–	3717	3452	3717	–	3098	–	2434
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	350	350	300	380	350	300	380	350	380	280	330	250	265
		in.lb	3098	3098	2655	3363	3098	2655	3363	3098	3363	2478	2921	2213	2345
Nominal output torque (with n_{2N})	T_{2N}	Nm	200	210	170	200	210	190	220	200	220	170	200	100	120
		in.lb	1770	1859	1505	1770	1859	1682	1947	1770	1947	1505	1770	885	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	625	625	625	625	625	625	625	625	625	625	625	625	625
		in.lb	5531	5531	5531	5531	5531	5531	5531	5531	5531	5531	5531	5531	5531
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	2800	2800	2800	2800	2800	2800	2800	2800	3100	3500	3500	4200	4200
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	1.8	1.5	1.4	1.4	1.1	1.1	1.0	0.8	0.8	0.7	0.7	0.6	0.6
		in.lb	15.9	13.3	12.4	12.4	9.7	9.7	8.9	7.1	7.1	6.2	6.2	5.3	5.3
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1												
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	81	81	70	83	80	54	82	76	80	61	71	55	60
		in.lb/ arcmin	717	717	620	735	708	478	726	673	708	540	628	487	531
Tilting rigidity	C_{2K}	Nm/ arcmin	550												
		in.lb/ arcmin	4867												
Max. axial force [d]	F_{2AMax}	N	4150												
		lb_f	934												
Max. tilting moment	M_{2KMax}	Nm	440												
		in.lb	3894												
Efficiency at full load	η	%	94												
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000												
Weight incl. standard adapter plate	m	kg	6.7												
		lb_m	14.8												
Operating noise (with i=100 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 60												
Max. permitted housing temperature		°C	+90												
		F	194												
Ambient temperature		°C	0 to +40												
		F	32 to 104												
Lubrication			Lubricated for life												
Paint			Blue RAL 5002												
Direction of rotation			Motor and gearhead same direction												
Protection class			IP 65												
Moment of inertia (relates to the drive)	C	14	J_1	kgcm²	0.66	0.55	0.60	0.53	0.44	0.55	0.43	0.38	0.38	0.39	0.37	0.38	0.37
				10^{-3} in.lb.s²	0.59	0.49	0.51	0.47	0.39	0.49	0.38	0.34	0.33	0.35	0.33	0.34	0.33
Clamping hub diameter [mm]	E	19	J_1	kgcm²	0.83	0.71	0.77	0.69	0.61	0.72	0.60	0.55	0.54	0.55	0.54	0.54	0.54
				10^{-3} in.lb.s²	0.73	0.63	0.68	0.61	0.54	0.64	0.53	0.49	0.48	0.4	0.48	0.48	0.48
	G	24	J_1	kgcm²	2.20	2.08	2.14	2.06	1.98	2.09	1.97	1.92	1.92	1.92	1.91	1.92	1.91
				10^{-3} in.lb.s²	1.95	1.84	1.89	1.82	1.75	1.85	1.74	1.70	1.70	1.70	1.69	1.70	1.69

Reduced mass moments of inertia available on request.

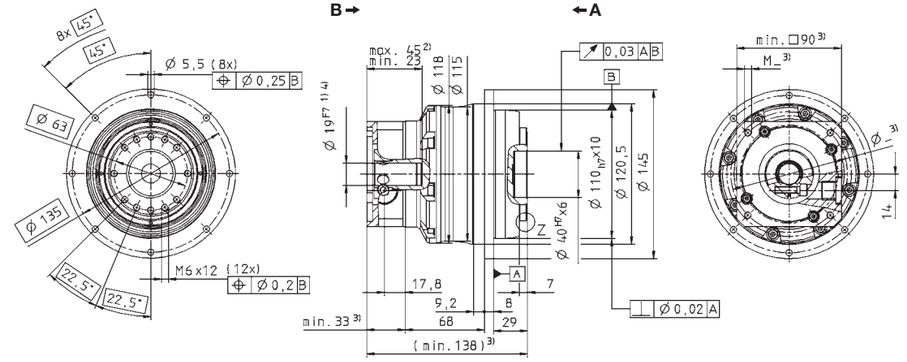
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

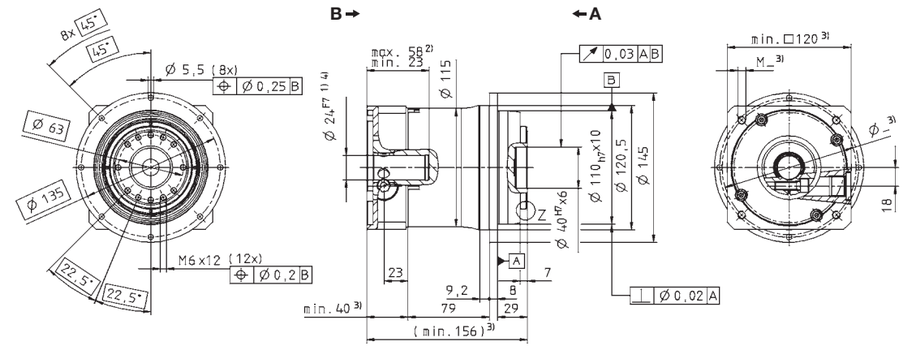
up to 14 [4] (C) clamping hub diameter

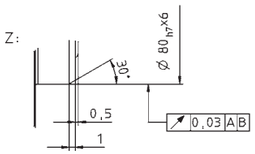


up to 19 [4] (E) clamping hub diameter



up to 24 [4] (G) clamping hub diameter





Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

			2-stage				3-stage				
Ratio [a]	i		**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	530	530	530	530	480	480	480	480	480
		in.lb	4691	4691	4691	4691	4248	4248	4248	4248	4248
Nominal output torque (with n_{1N})	T_{2N}	Nm	320	350	375	375	260	260	260	260	260
		in.lb	2832	3098	3319	3319	2301	2301	2301	2301	2301
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1200	1200	1200	1200	1200	1200	1200	1200	1200
		in.lb	10620	10620	10620	10620	10620	10620	10620	10620	10620
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	3500	3500	3500	3500	4000	4000	4000	4000	4000
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	1.0	–	–	–	–	–	0.5	–	–
		in.lb	8.9						4.4		
Max. torsional backlash	j_t	arcmin	≤ 1				≤ 1				
Torsional rigidity [c]	C_{t21}	Nm/ arcmin	105	105	105	100	95	95	95	95	95
		in.lb/ arcmin	929	929	929	885	841	841	841	841	841
Tilting rigidity	C_{2K}	Nm/ arcmin	550				550				
		in.lb/ arcmin	4868				4868				
Max. axial force [d]	F_{2AMax}	N	4150				4150				
		lb_f	934				934				
Max. tilting moment	M_{2KMax}	Nm	550				550				
		in.lb	4868				4868				
Efficiency at full load	η	%	94				92				
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				> 20000				
Weight incl. standard adapter plate	m	kg	5.6				6.1				
		lb_m	12.4				13.5				
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 62				≤ 62				
Max. permitted housing temperature		°C	+90								
		F	194								
Ambient temperature		°C	0 to +40								
		F	32 to 104								
Lubrication			Lubricated for life								
Paint			Blue RAL 5002								
Direction of rotation			Motor and gearhead same direction								
Protection class			IP 65								
Moment of inertia (relates to the drive)	E 19	J_1	kgcm²	0.87	0.70	0.60	0.55	0.63	0.56	0.53	0.51	0.50
			10^{-3} in.lb.s²	0.77	0.62	0.53	0.49	0.56	0.50	0.47	0.45	0.44
Clamping hub diameter [mm]	G 24	J_1	kgcm²	2.39	2.22	2.12	2.07	–	–	–	–	–
			10^{-3} in.lb.s²	2.12	1.96	1.88	1.83					

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

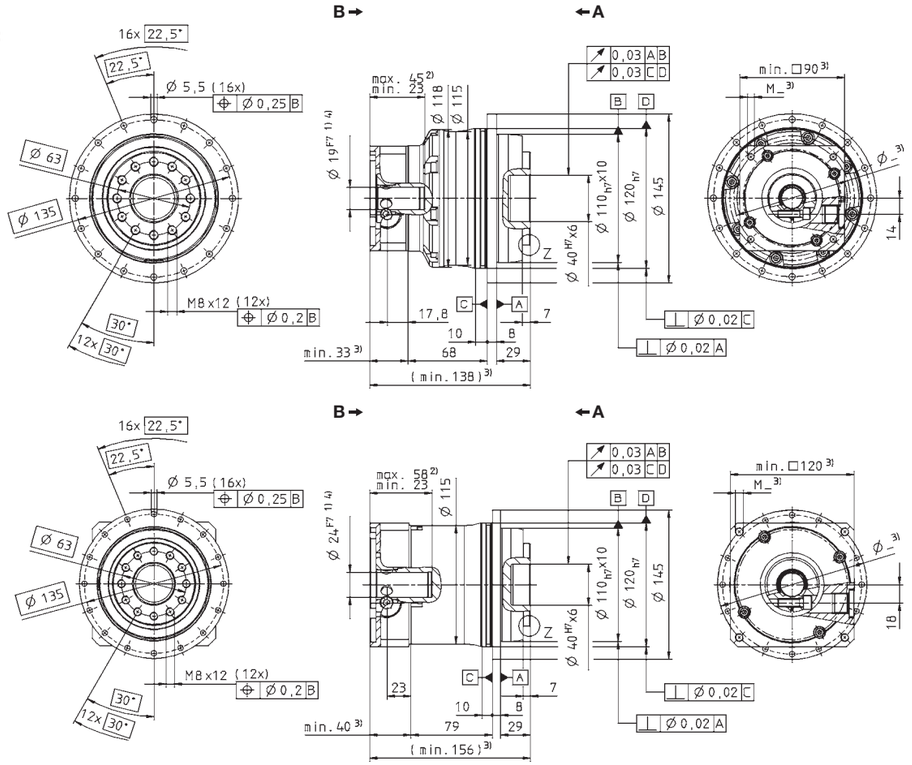
up to 19 [4] (E) clamping hub diameter

up to 24 [4] (G) clamping hub diameter

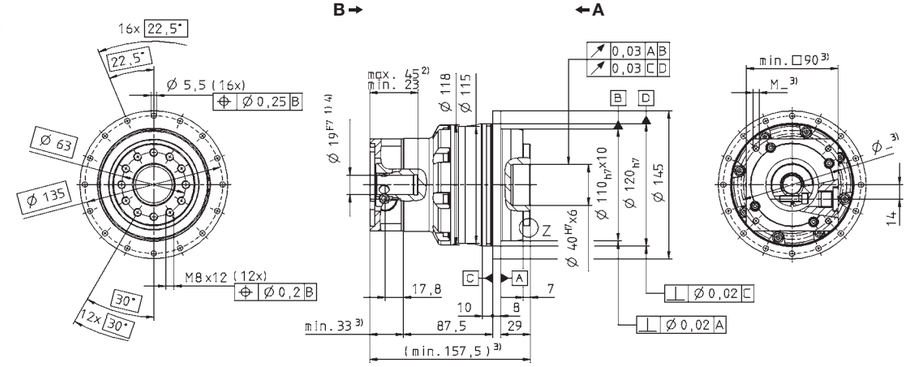
View A

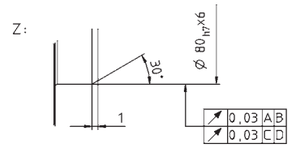
View B

2-stage:



3-stage:





Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 050 1-stage

			1-stage			
Ratio [a]	i		**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	750	800	–	600
		in.lb	6638	7080	–	5310
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	700	700	700	540
		in.lb	6195	6195	6195	4779
Nominal output torque (with n_{2N})	T_{2N}	Nm	370	370	370	240
		in.lb	3275	3275	3275	2124
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1250	1250	1250	1250
		in.lb	11063	11063	11063	11063
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	1900	2000	2500	2500
Max. input speed	n_{1Max}	rpm	4000	4000	4000	4000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	8.1	6.6	4.8	3.5
		in.lb	71.7	58.4	42.5	31.0
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	190	187	159	123
		in.lb/ arcmin	1682	1655	1407	1089
Tilting rigidity	C_{2K}	Nm/ arcmin	560			
		in.lb/ arcmin	4956			
Max. axial force [d]	F_{2AMax}	N	6130			
		lb_f	1379			
Max. tilting moment	M_{2KMax}	Nm	1335			
		in.lb	11815			
Efficiency at full load	η	%	97			
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000			
Weight incl. standard adapter plate	m	kg	14.0			
		lb_m	30.9			
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 65			
Max. permitted housing temperature		°C	+90			
		F	194			
Ambient temperature		°C	0 to +40			
		F	32 to 104			
Lubrication			Lubricated for life			
Paint			Blue RAL 5002			
Direction of rotation			Motor and gearhead same direction			
Protection class			IP 65			
Moment of inertia (relates to the drive)	G 24	J_1	kgcm²	9.47	7.85	6.39	5.54
			10^{-3} in.lb.s²	8.38	6.95	5.66	4.90
Clamping hub diameter [mm]	I 32	J_1	kgcm²	12.6	11.0	9.55	8.71
			10^{-3} in.lb.s²	11.1	9.74	8.45	7.70
	K 38	J_1	kgcm²	13.7	12.1	10.6	9.78
			10^{-3} in.lb.s²	12.1	10.7	9.38	8.65
	M 48	J_1	kgcm²	28.3	26.7	25.3	24.4
			10^{-3} in.lb.s²	25.0	23.6	22.4	21.6

Reduced mass moments of inertia available on request.

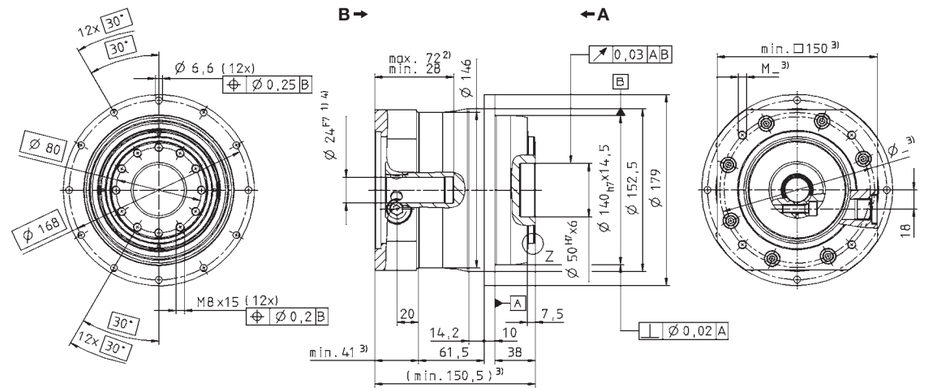
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 32 and 38 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

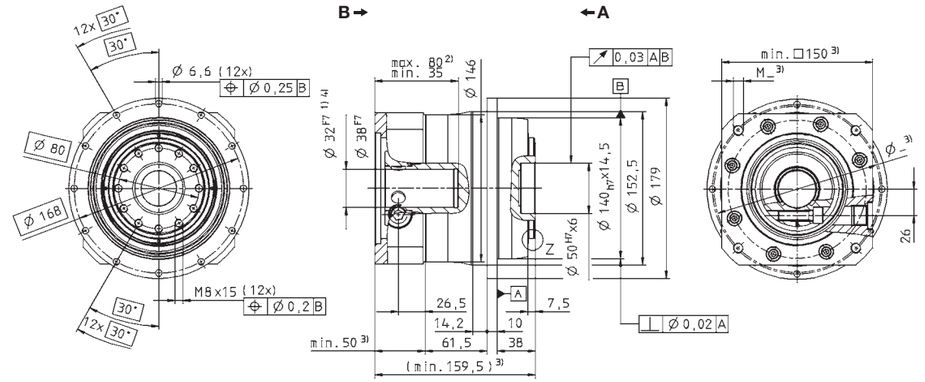
View A

View B

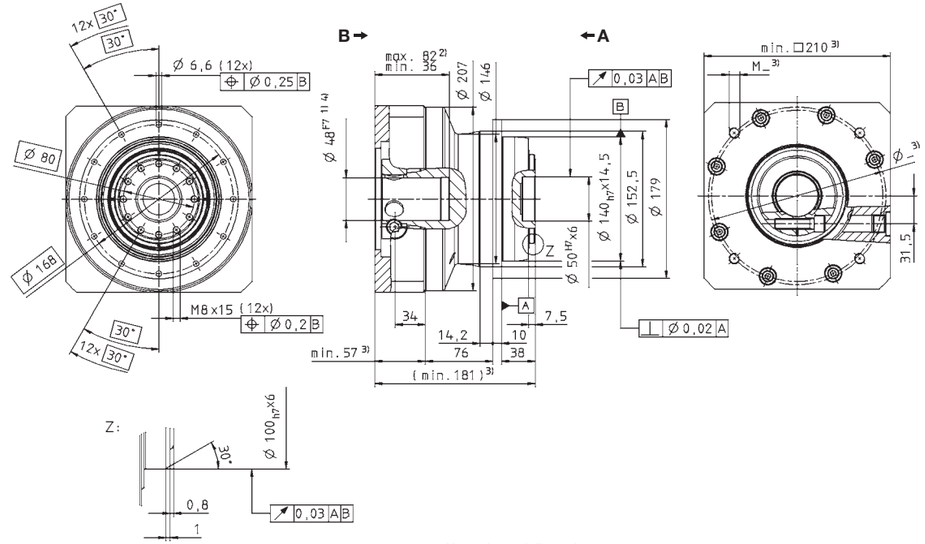
up to 24 [4] (G) clamping hub diameter



up to 32/38 [4] (I/K) clamping hub diameter



up to 48 [4] (M) clamping hub diameter



Non-tolerated dimensions ±1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

			2-stage												
Ratio [a]	i		**16**	**20**	**21**	**25**	**28**	**31**	**35**	**40**	**50**	**61**	**70**	**91**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	800	800	–	800	800	–	800	800	800	–	–	–	600
		in.lb	7080	7080	–	7080	7080	–	7080	7080	7080	–	–	–	5310
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	750	750	600	750	750	620	750	750	750	550	700	500	540
		in.lb	6638	6638	5310	6638	6638	5487	6638	6638	6638	4868	6195	4425	4779
Nominal output torque (with n_{2N})	T_{2N}	Nm	400	400	350	400	400	400	400	400	400	350	400	220	240
		in.lb	3540	3540	3098	3540	3540	3540	3540	3540	3540	3098	3540	1947	2124
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
		in.lb	11063	11063	11063	11063	11063	11063	11063	11063	11063	11063	11063	11063	11063
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	2900	2900	2900	2900	2900	2900	2900	2900	3200	3200	3200	3900	3900
Max. input speed	n_{1Max}	rpm	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	4.2	3.4	3.3	3.1	2.5	2.4	2.3	1.8	1.7	1.5	1.5	1.4	1.3
		in.lb	37.2	30.1	29.2	27.4	22.1	21.2	20.4	15.9	15.1	13.3	13.3	12.4	11.5
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1												
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	180	185	145	180	180	130	175	175	175	123	145	100	115
		in.lb/ arcmin	1593	1637	1283	1593	1593	1151	1549	1549	1549	1089	1283	885	1018
Tilting rigidity	C_{2K}	Nm/ arcmin	560												
		in.lb/ arcmin	4956												
Max. axial force [d]	F_{2AMax}	N	6130												
		lb_f	1379												
Max. tilting moment	M_{2KMax}	Nm	1335												
		in.lb	11815												
Efficiency at full load	η	%	94												
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000												
Weight incl. standardadapter plate	m	kg	14.1												
		lb_m	31.2												
Operating noise (with i=100 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 63												
Max. permitted housing temperature		°C	+90												
		F	194												
Ambient temperature		°C	0 to +40												
		F	32 to 104												
Lubrication			Lubricated for life												
Paint			Blue RAL 5002												
Direction of rotation			Motor and gearhead same direction												
Protection class			IP 65												
Moment of inertia (relates to the drive)	E	19	J_1	kgcm²	2.53	2.07	2.30	2.01	1.67	2.12	1.64	1.44	1.42	1.46	1.41	1.43	1.40
				10^{-4} in.lb.s²	2.24	1.83	2.04	1.78	1.48	1.88	1.45	1.27	1.26	1.29	1.25	1.27	1.24
Clamping hub diameter [mm]	G	24	J_1	kgcm²	3.22	2.77	2.99	2.70	2.36	2.81	2.33	2.13	2.12	2.15	2.10	2.12	2.09
				10^{-4} in.lb.s²	2.85	2.45	2.65	2.39	2.09	2.49	2.06	1.89	1.88	1.90	1.86	1.88	1.85
	K	38	J_1	kgcm²	10.3	9.83	10.1	9.77	9.43	9.88	9.40	9.20	9.18	9.22	9.17	9.19	9.16
				10^{-4} in.lb.s²	9.11	8.70	8.94	8.64	8.35	8.74	8.32	8.14	8.12	8.16	8.12	8.13	8.11

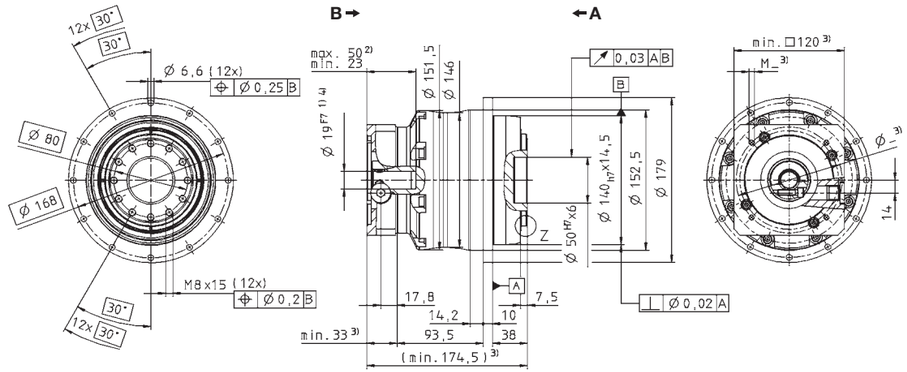
Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 24 mm
[d] Refers to center of the output shaft or flange

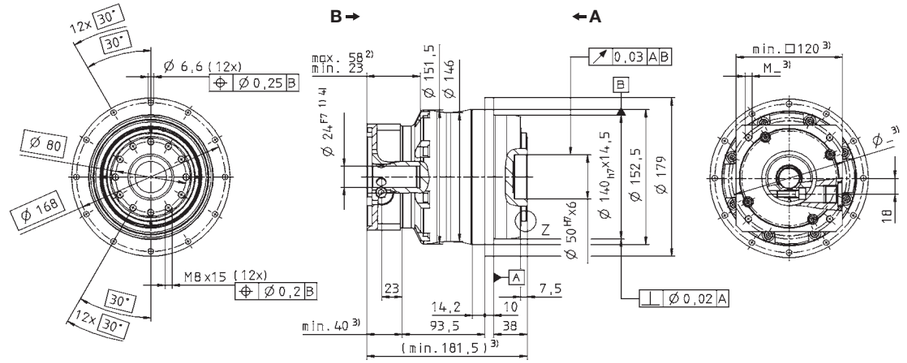
Motor shaft diameter [mm]

View A

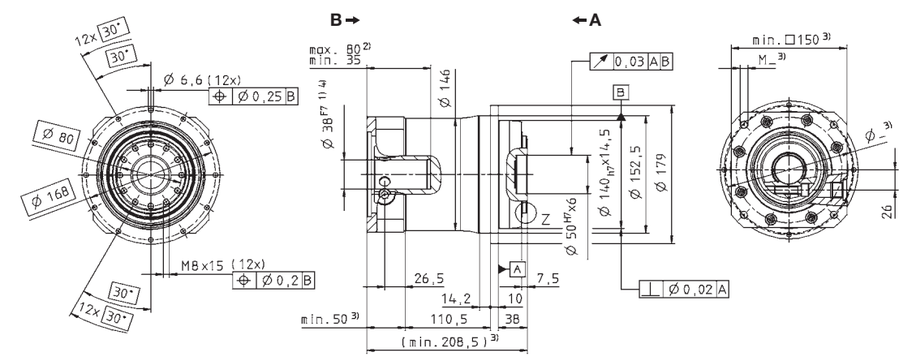
up to 19 [4] (E) clamping hub diameter



up to 24 [4] (G) clamping hub diameter



up to 38 [4] (K) clamping hub diameter



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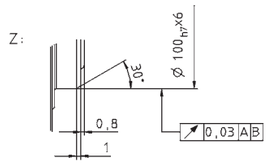


Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

			2-stage				3-stage				
Ratio [a]	i		**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	950	950	950	950	950	950	950	950	950
		in.lb	8408	8408	8408	8408	8408	8408	8408	8408	8408
Nominal output torque (with n_{1N})	T_{2N}	Nm	575	600	650	675	675	675	675	675	675
		in.lb	5089	5310	5753	5974	5974	5974	5974	5974	5974
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	2375	2375	2375	2375	2375	2375	2375	2375	2375
		in.lb	21019	21019	21019	21019	21019	21019	21019	21019	21019
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	3000	3000	3000	3000	3500	3500	3500	3500	3500
Max. input speed	n_{1Max}	rpm	5000	5000	5000	5000	5000	5000	5000	5000	5000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	2.7	–	–	–	–	–	1.1	–	0.7
		in.lb	23.9						9.7		6.2
Max. torsional backlash	j_t	arcmin	≤ 1				≤ 1				
Torsional rigidity [c]	C_{t21}	Nm/ arcmin	220	220	220	220	205	205	205	205	205
		in.lb/ arcmin	1947	1947	1947	1947	1814	1814	1814	1814	1814
Tilting rigidity	C_{2K}	Nm/ arcmin	560				560				
		in.lb/ arcmin	4956				4956				
Max. axial force [d]	F_{2AMax}	N	6130				6130				
		lb_f	1379				1379				
Max. tilting moment	M_{2KMax}	Nm	1335				1335				
		in.lb	11815				11815				
Efficiency at full load	η	%	94				92				
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				> 20000				
Weight incl. standard adapter plate	m	kg	12.5				13.4				
		lb_m	27.6				29.6				
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 64				≤ 64				
Max. permitted housing temperature		°C	+90								
		F	194								
Ambient temperature		°C	0 to +40								
		F	32 to 104								
Lubrication			Lubricated for life								
Paint			Blue RAL 5002								
Direction of rotation			Motor and gearhead same direction								
Protection class			IP 65								
Moment of inertia (relates to the drive)	G 24	J_1	kgcm²	3.76	3.32	3.01	2.82	2.61	2.42	2.22	2.12	2.07
			10^{-3} in.lb.s²	3.33	2.94	2.66	2.50	2.31	2.14	1.96	1.88	1.83
Clamping hub diameter [mm]	K 38	J_1	kgcm²	10.7	10.3	9.92	9.73	–	–	–	–	–
			10^{-3} in.lb.s²	9.47	9.11	8.78	8.61					

Reduced mass moments of inertia available on request.

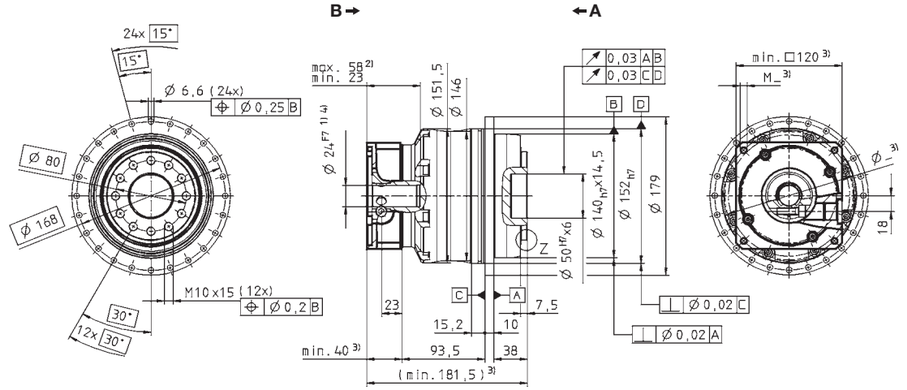
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 24 mm
[d] Refers to center of the output shaft or flange

View A View B

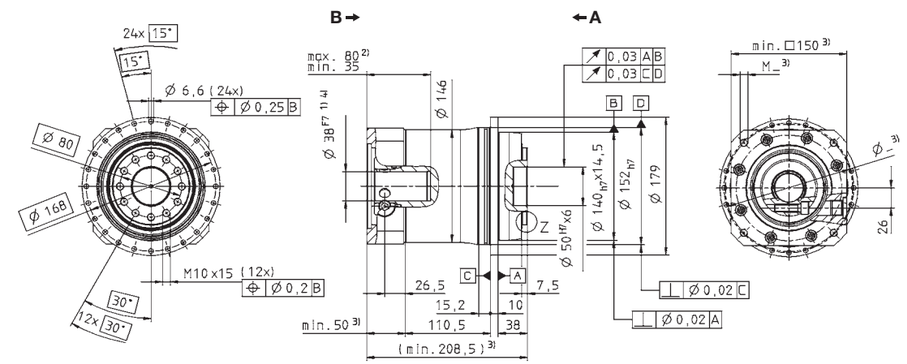
Motor shaft diameter [mm]

up to 24 [4] (G) clamping hub diameter

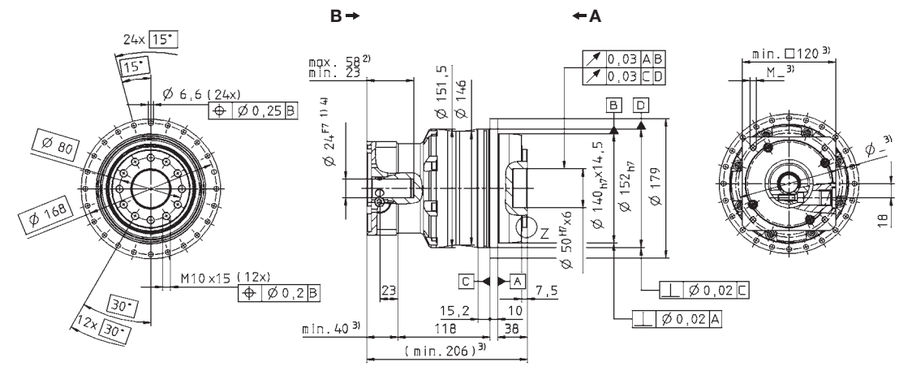
2-stage:



up to 38 [4] (K) clamping hub diameter



3-stage:



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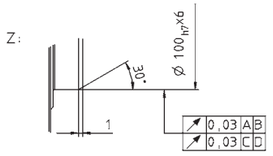


Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 110 1-stage

			1-stage			
Ratio [a]	i		**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	1900	2000	1900	1500
		in.lb	16815	17700	16815	13275
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1600	1600	1600	1400
		in.lb	14160	14160	14160	12390
Nominal output torque (with n_{2N})	T_{2N}	Nm	700	750	750	750
		in.lb	6195	6638	6638	6638
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	2750	2750	2750	2750
		in.lb	24338	24338	24338	24338
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	1400	1500	2000	2000
Max. input speed	n_{1Max}	rpm	3500	3500	3500	3500
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	15.6	12.7	9.4	7.0
		in.lb	138.1	112.4	83.2	62.0
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	610	610	550	445
		in.lb/ arcmin	5399	5399	4868	3938
Tilting rigidity	C_{2K}	Nm/ arcmin	1452			
		in.lb/ arcmin	12850			
Max. axial force [d]	F_{2AMax}	N	10050			
		lb_f	2261			
Max. tilting moment	M_{2KMax}	Nm	3280			
		in.lb	29028			
Efficiency at full load	η	%	97			
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000			
Weight incl. standard adapter plate	m	kg	30.0			
		lb_m	66			
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 66			
Max. permitted housing temperature		°C	+90			
		F	194			
Ambient temperature		°C	0 to +40			
		F	32 to 104			
Lubrication			Lubricated for life			
Paint			Blue RAL 5002			
Direction of rotation			Motor and gearhead same direction			
Protection class			IP 65			
Moment of inertia (relates to the drive) K 38	J_1	kgcm²	44.5	34.6	25.5	20.6
		10^{-3} in.lb.s²	39.4	30.6	22.6	18.2
Moment of inertia (relates to the drive) M 48 Clamping hub diameter [mm]	J_1	kgcm²	51.8	41.9	32.9	28.0
		10^{-3} in.lb.s²	45.8	37.1	29.1	24.8

Reduced mass moments of inertia available on request.

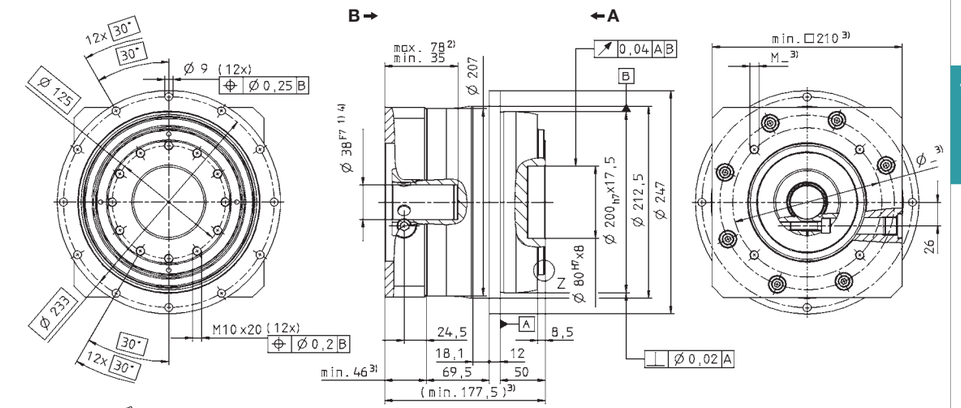
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 48 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

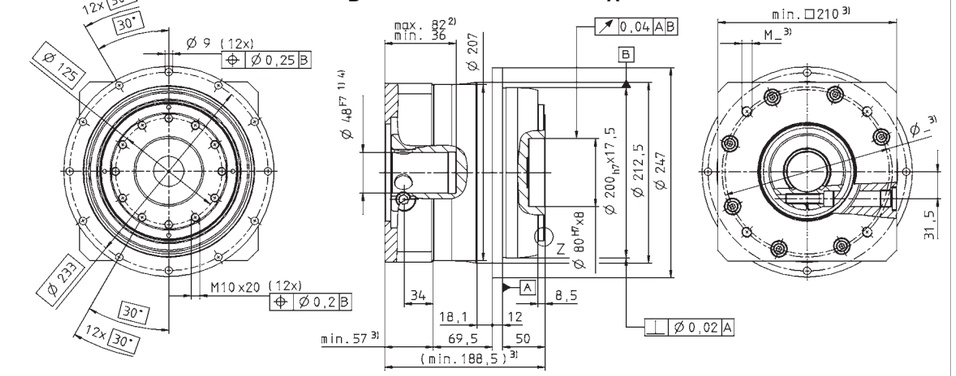
up to 38 [4] (K) clamping hub diameter

up to 48 [4] (M) clamping hub diameter

View A



View B



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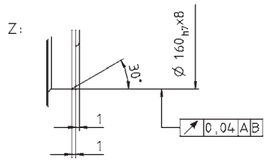


Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 110 2-stage

			2-stage												
Ratio [a]	i		**16**	**20**	**21**	**25**	**28**	**31**	**35**	**40**	**50**	**61**	**70**	**91**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	2000	2000	–	2000	2000	–	2000	1800	1800	–	1800	–	1500
		in.lb	17700	17700	–	17700	17700	–	17700	15930	15930	–	15930	–	13275
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1600	1600	1400	1600	1600	1600	1600	1600	1600	1400	1600	1300	1400
		in.lb	14160	14160	12390	14160	14160	14160	14160	14160	14160	12390	14160	11505	12390
Nominal output torque (with n_{2N})	T_{2N}	Nm	980	980	850	1050	1050	1250	1250	850	1050	1100	900	700	800
		in.lb	8673	8673	7523	9293	9293	11063	11063	7523	9293	9735	7965	6195	7080
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750
		in.lb	24338	24338	24338	24338	24338	24338	24338	24338	24338	24338	24338	24338	24338
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	2500	2500	2500	2500	2500	2500	2500	2500	2900	3200	3200	3400	3400
Max. input speed	n_{1Max}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	6.9	5.6	5.5	5.0	4.1	3.9	3.7	3.0	2.7	2.5	2.4	2.2	2.2
		in.lb	61.1	49.6	48.7	44.3	36.3	34.5	32.7	26.6	23.9	22.1	21.2	19.5	19.5
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1												
Torsional rigidity [c]	C_{t12}	Nm/ arcmin	585	580	465	570	560	440	560	520	525	415	480	360	395
		in.lb/ arcmin	5177	5133	4115	5045	4956	3894	4956	4602	4646	3673	4248	3186	3496
Tilting rigidity	C_{2K}	Nm/ arcmin	1452												
		in.lb/ arcmin	12850												
Max. axial force [d]	F_{2AMax}	N	10050												
		lb_f	2261												
Max. tilting moment	M_{2KMax}	Nm	3280												
		in.lb	29028												
Efficiency at full load	η	%	94												
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000												
Weight incl. standardadapter plate	m	kg	34.0												
		lb_m	75.1												
Operating noise (with i=100 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 66												
Max. permitted housing temperature		°C	+90												
		F	194												
Ambient temperature		°C	0 to +40												
		F	32 to 104												
Lubrication			Lubricated for life												
Paint			Blue RAL 5002												
Direction of rotation			Motor and gearhead same direction												
Protection class			IP 65												
Moment of inertia (relates to the drive)	G	24	J_1	kgcm²	8.51	8.21	8.98	7.82	6.57	8.09	6.37	5.63	5.54	5.63	5.44	5.50	5.39
				10^{-3} in.lb.s²	7.53	7.27	7.95	6.92	5.81	7.16	5.64	4.99	4.90	4.99	4.82	4.87	4.77
Clamping hub diameter [mm]	I	32	J_1	kgcm²	11.7	11.4	12.1	11.0	9.73	11.3	9.54	8.80	8.70	8.79	8.61	8.67	8.56
				10^{-3} in.lb.s²	10.3	10.1	10.7	9.72	8.61	9.96	8.44	7.78	7.70	7.78	7.62	7.67	7.57
	K	38	J_1	kgcm²	12.7	12.5	13.2	12.1	10.8	12.3	10.6	9.87	9.77	9.87	9.68	9.74	9.63
				10^{-3} in.lb.s²	11.3	11.0	11.7	10.7	9.6	10.9	9.39	8.73	8.65	8.73	8.56	8.62	8.52
	M	48	J_1	kgcm²	27.4	27.1	27.8	26.7	25.4	26.9	25.3	24.5	24.4	24.5	24.3	24.4	24.3
				10^{-3} in.lb.s²	24.2	24.0	24.6	23.6	22.5	23.8	22.3	21.7	21.6	21.7	21.5	21.6	21.5

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 32 and 38 mm
[d] Refers to center of the output shaft or flange

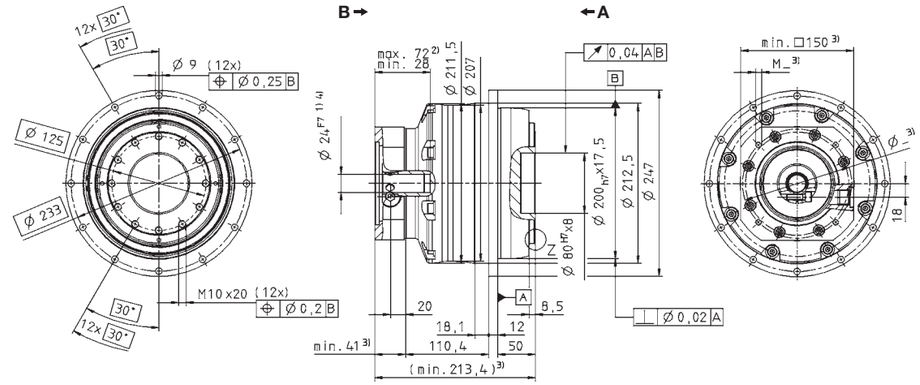
Motor shaft diameter [mm]

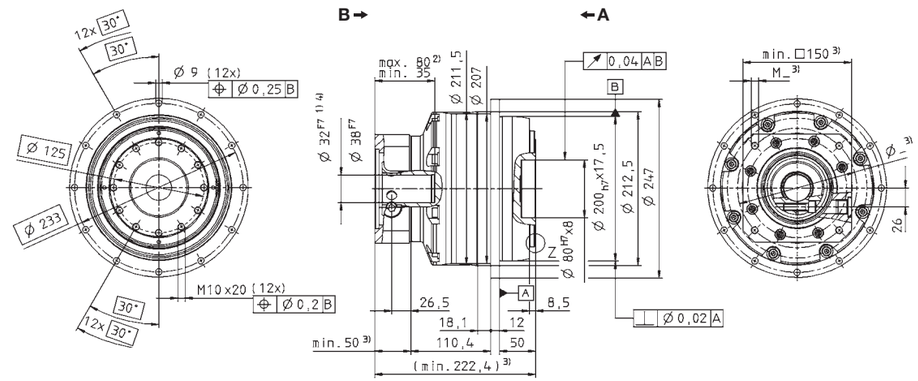
up to 24 [4] (G) clamping hub diameter

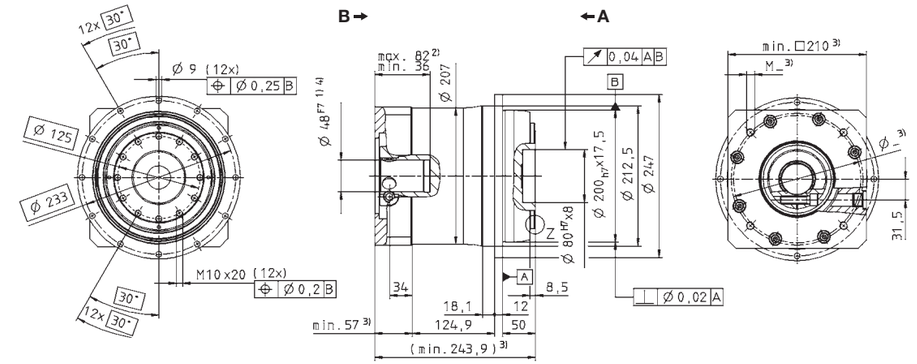
up to 32/38 [4] (I/K) clamping hub diameter

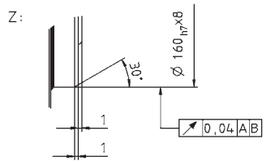
up to 48 [4] (M) clamping hub diameter

View A









Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

				2-stage				3-stage				
Ratio [a]	i			**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	3100	3100	3100	2000	2600	2600	2600	2600	2600
			in.lb	27435	27435	27435	17700	23010	23010	23010	23010	23010
Nominal output torque (with n_{1N})	T_{2N}		Nm	1570	1600	1650	1400	1600	1750	1750	1750	1750
			in.lb	13895	14160	14603	12390	14160	15488	15488	15488	15488
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	6500	6500	6500	6500	6500	6500	6500	6500	6500
			in.lb	57525	57525	57525	57525	57525	57525	57525	57525	57525
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}		rpm	2500	2500	2500	2500	3000	3000	3000	3000	3000
Max. input speed	n_{1Max}		rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}		Nm	6.5	–	–	–	–	3.3	2.5	–	–
			in.lb	57.5					29.2	22.1		
Max. torsional backlash	j_t		arcmin	≤ 1				≤ 1				
Torsional rigidity [c]	C_{t12}		Nm/ arcmin	730	725	715	670	650	650	650	650	650
			in.lb/ arcmin	6461	6416	6328	5930	5753	5753	5753	5753	5753
Tilting rigidity	C_{2K}		Nm/ arcmin	1452				1452				
			in.lb/ arcmin	12850				12850				
Max. axial force [d]	F_{2AMax}		N	10050				10050				
			lb_f	2261				2261				
Max. tilting moment	M_{2KMax}		Nm	3280				3280				
			in.lb	29028				29028				
Efficiency at full load	η		%	94				92				
Service life (For calculation, see the Chapter "Information")	L_h		h	> 20000				> 20000				
Weight incl. standard adapter plate	m		kg	33.1				35.4				
			lb_m	73.2				78.2				
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}		dB(A)	≤ 66				≤ 66				
Max. permitted housing temperature			°C	+90								
			F	194								
Ambient temperature			°C	0 to +40								
			F	32 to 104								
Lubrication				Lubricated for life								
Paint				Blue RAL 5002								
Direction of rotation				Motor and gearhead same direction								
Protection class				IP 65								
Moment of inertia (relates to the drive)	K	38	J_1	kgcm²	16.6	15.2	13.9	13.1	13.8	10.2	9.77	9.47	9.16
				10^{-3} in.lb.s²	14.7	13.5	12.3	11.6	12.2	9.03	8.65	8.38	8.11
Clamping hub diameter [mm]	M	48	J_1	kgcm²	31.4	29.9	28.7	28.0	–	–	–	–	–
				10^{-3} in.lb.s²	27.8	26.5	25.4	24.8					

Reduced mass moments of inertia available on request.

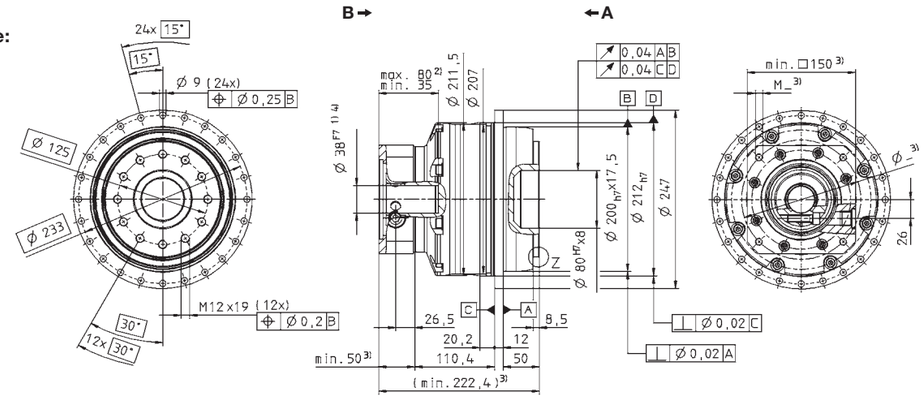
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 38 mm
[d] Refers to center of the output shaft or flange

View A View B

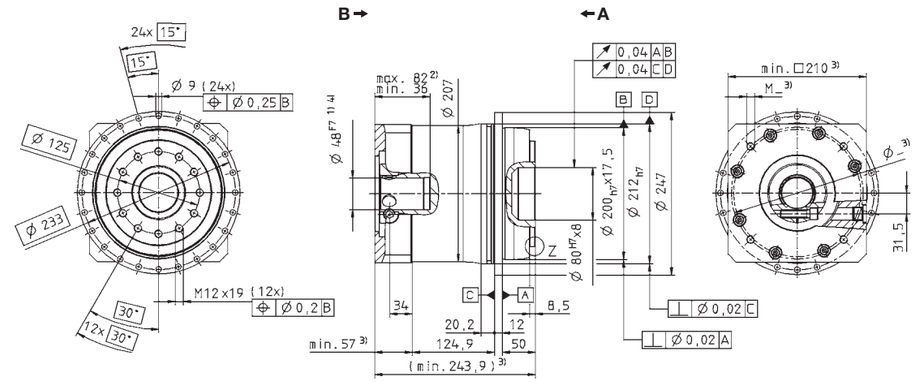
Motor shaft diameter [mm]

2-stage:

up to 38 [4] (K) clamping hub diameter

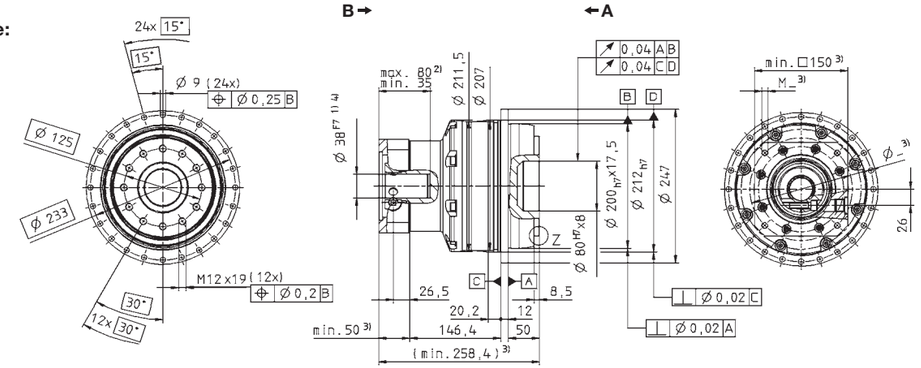


up to 48 [4] (M) clamping hub diameter



3-stage:

up to 38 [4] (K) clamping hub diameter



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 300 1/2-stage

			1-stage			2-stage									
Ratio [a]	i		**5**	**7**	**10**	**20**	**21**	**25**	**31**	**35**	**50**	**61**	**70**	**91**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	3500	3300	1900	3500	3400	3500	3500	3500	3000	2800	3300	2800	2800
		in.lb	30975	29205	16815	30975	30090	30975	30975	30975	26550	24780	29205	24780	24780
Nominal output torque (with n_{1N})	T_{2N}	Nm	2200	1800	1000	2300	2100	2400	2200	2500	1900	1600	1800	1600	1600
		in.lb	19470	15930	8850	20355	18585	21240	19470	22125	16815	14160	15930	14160	14160
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	8750	8750	8750	8750	8750	8750	8750	8750	8750	8750	8750	8750	8750
		in.lb	77438	77438	77438	77438	77438	77438	77438	77438	77438	77438	77438	77438	77438
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	1000	1400	1700	2000	2000	2000	2000	2000	2300	2400	2400	2500	2500
Max. input speed	n_{1Max}	rpm	2500	2500	2500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}	Nm	23	17	11	10	9,5	9,0	7,0	6,0	5,0	4,0	4,0	3,5	3,5
		in.lb	204	150	97	89	84	80	62	53	44	35	35	31	31
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1			Standard ≤ 3 / Reduced ≤ 2									
Torsional rigidity	C_{t12}	Nm/ arcmin	1000	900	700	850	800	950	750	900	800	700	800	600	650
		in.lb/ arcmin	8850	7965	6195	7523	7080	9408	6638	7965	7080	6195	7080	5310	5753
Tilting rigidity	C_{2K}	Nm/ arcmin	5560												
		in.lb/ arcmin	49206												
Max. axial force [c]	F_{2AMax}	N	33000												
		lb_f	7425												
Max. tilting moment	M_{2KMax}	Nm	3900			5900									
		in.lb	34515			52215									
Efficiency at full load	η	%	95			93									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000												
Weight incl. standard adapter plate	m	kg	60			58.5									
		lb_m	132.6			129.3									
Operating noise (with i=10 and n_1=2000 rpm without load)	L_{PA}	dB(A)	≤ 64												
Max. permitted housing temperature		°C	+90												
		F	194												
Ambient temperature		°C	0 to +40												
		F	32 to 104												
Lubrication			Lubricated for life												
Paint			Blue RAL 5002												
Direction of rotation			Motor and gearhead same direction												
Protection class			IP 65												
Moment of inertia (relates to the drive)	M 48	J_1 kgcm²	–	–	–	27.5	27.0	25.9	25.6	22.4	21.5	21.4	21.3	21.2	21.2
		J_1 10^{-3} in.lb.s²				24.3	23.9	22.9	22.7	19.8	19.0	18.9	18.9	18.8	18.8
Clamping hub diameter [mm]	N 55	J_1 kgcm²	82.6	61.2	49.5	–	–	–	–	–	–	–	–	–	–
		J_1 10^{-3} in.lb.s²	73.1	54.2	43.8										

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

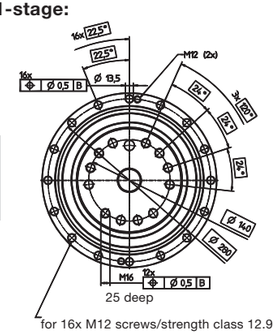
View A

View B

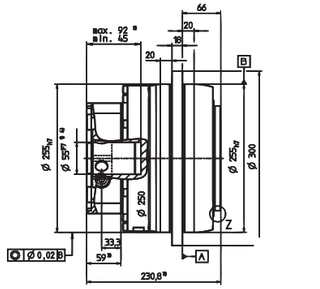
Motor shaft diameter [mm]

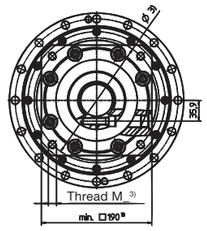
up to 55 [4] (N) clamping hub diameter

1-stage:



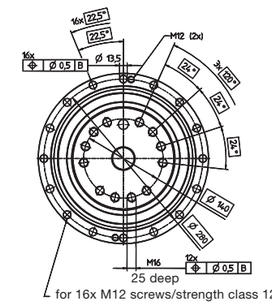
for 16x M12 screws/strength class 12.9



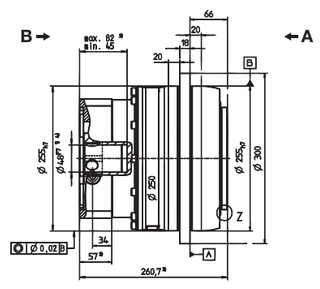


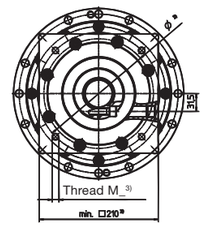
2-stage:

up to 48 [4] (M) clamping hub diameter

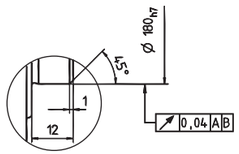


for 16x M12 screws/strength class 12.9





Z: Detail



Non-tolerated dimensions ±1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

			1-stage	2-stage				3-stage				
Ratio [a]	i		**5.5**	**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	4600	5500	5500	5500	3900	5500	5500	5500	5500	5500
		in.lb	40714	48679	48679	48679	34518	48679	48679	48679	48679	48679
Nominal output torque (with n_{1N})	T_{2N}	Nm	2200	3500	3500	3500	2500	3500	3500	3500	3500	3500
		in.lb	19472	30978	30978	30978	22127	30978	30978	30978	30978	30978
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	8750	13250	13250	13250	13250	13250	13250	13250	13250	13250
		in.lb	77445	117273	117273	117273	117273	117273	117273	117273	117273	117273
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	1000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Max. input speed	n_{1Max}	rpm	2500	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}	Nm	22	12	10	9,0	7,0	6,5	4,5	4,0	3,0	2,0
		in.lb	195	106	89	80	62	58	40	35	27	18
Max. torsional backlash	j_t	arcmin	Standard ≤ 2 / Reduced ≤ 1	Standard ≤ 3 / Reduced ≤ 1.5								
Torsional rigidity	C_{t12}	Nm/ arcmin	1400	1200	–	–	–	–	–	1200	–	–
		in.lb/ arcmin	12391	10621						10621		
Tilting rigidity	C_{2K}	Nm/ arcmin	5560									
		in.lb/ arcmin	49210									
Max. axial force [c]	F_{2AMax}	N	33000									
		lb_f	7425									
Max. tilting moment	M_{2KMax}	Nm	3900	6500								
		in.lb	34518	57530								
Efficiency at full load	η	%	95	93								
Service life (For calculation. see "Technical Basics")	L_h	h	> 20000									
Weight incl. standard adapter plate	m	kg	55	64				67				
		lb_m	121.25	141.1				147.7				
Operating noise (with n_1 = 2000 rpm no load)	L_{PA}	dB(A)	≤ 68	≤ 67				≤ 66				
Max. permitted housing temperature		°C	+90									
		F	194									
Ambient temperature		°C	0 to +40									
		F	32 to 104									
Lubrication			Lubricated for life									
Paint			Blue RAL 5002									
Direction of rotation			Motor and gearhead same direction									
Protection class			IP 65									
Moment of inertia (relates to the drive)	K	38	J_1 kgcm²	–	–	–	–	–	16.6	12.9	11.6	10.3	9.50
			in.lb.s²						0.0147	0.0114	0.0103	0.0091	0.0084
Clamping hub diameter [mm]	M	48	J_1 kgcm²	–	30.8	27.6	24.9	23.0	–	–	–	–	–
			in.lb.s²		0.0273	0.0244	0.0220	0.0204					
	N	55	J_1 kgcm²	129	–	–	–	–	–	–	–	–	–
			in.lb.s²	0.1142									

Reduced mass moments of inertia available on request.

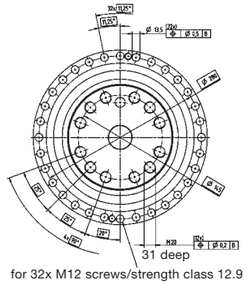
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

View A

Motor shaft diameter [mm]

up to 55 [4] (N) clamping hub diameter

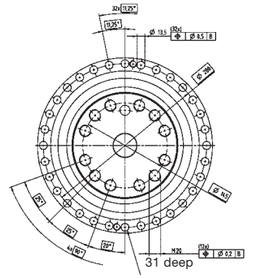
1-stage:



for 32x M12 screws/strength class 12.9

up to 48 [4] (M) clamping hub diameter

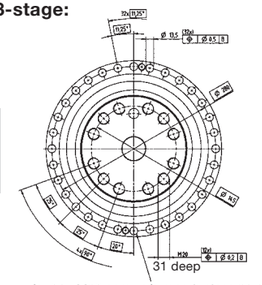
2-stage:



for 32x M12 screws/strength class 12.9

up to 38 [4] (K) clamping hub diameter

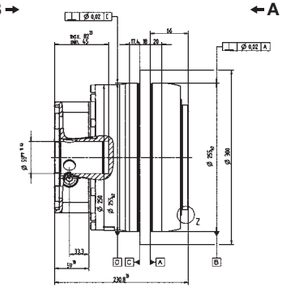
3-stage:

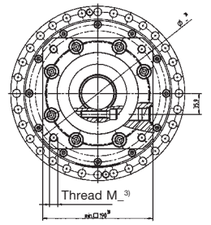


for 32x M12 screws/strength class 12.9

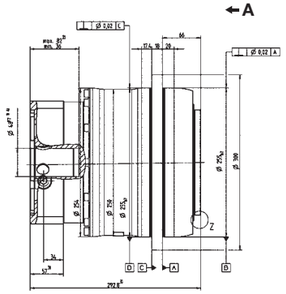
View B

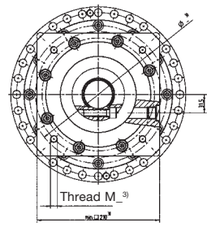
B→ ←A



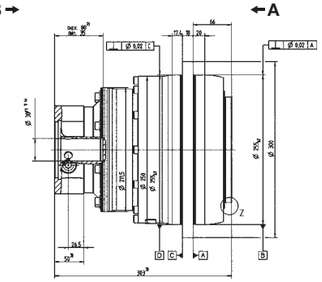


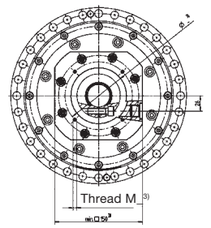
B→ ←A



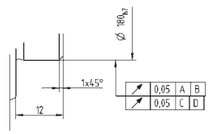


B→ ←A





Z: Detail



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TP+ 500 1/2-stage

			1-stage			2-stage									
Ratio [a]	i		**5**	**7**	**10**	**20**	**21**	**25**	**31**	**35**	**50**	**61**	**70**	**91**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	6000	5000	3400	6000	5000	6000	6000	6000	4500	4800	5000	4800	4800
		in.lb	53100	44250	30090	53100	44250	53100	53100	53100	39825	42480	44250	42480	42480
Nominal output torque (with n_{1N})	T_{2N}	Nm	3250	2800	1700	3350	3200	3800	3700	3800	2900	2900	2800	2900	2900
		in.lb	28763	24780	15045	29648	28320	33630	32745	33630	25665	25665	24780	25665	25665
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
		in.lb	132750	132750	132750	132750	132750	132750	132750	132750	132750	132750	132750	132750	132750
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	900	1300	1500	1500	1500	1500	1500	1500	2000	2100	2100	2200	2200
Max. input speed	n_{1Max}	rpm	2200	2200	2200	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}	Nm	30	22	14	13	12	10	8,0	7,0	6,0	5,0	5,0	4,5	4,5
		in.lb	266	195	124	115	106	89	71	62	53	44	44	40	40
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1			Standard ≤ 3 / Reduced ≤ 2									
Torsional rigidity	C_{t12}	Nm/ arcmin	1450	1300	1100	1400	1200	1450	1200	1400	1300	1100	1250	950	1050
		in.lb/ arcmin	12833	11505	9735	12390	10620	12833	10620	12390	11505	9735	11063	8401	9293
Tilting rigidity	C_{2K}	Nm/ arcmin	9480												
		in.lb/ arcmin	83898												
Max. axial force [c]	F_{2AMax}	N	50000												
		lb_f	11250												
Max. tilting moment	M_{2KMax}	Nm	5500			8800									
		in.lb	48675			77880									
Efficiency at full load	η	%	95			93									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000												
Weight incl. standard adapter plate	m	kg	82			77.5									
		lb_m	181.2			171.3									
Operating noise (with i=10 and n_1=2000 rpm no load)	L_{PA}	dB(A)	≤ 66												
Max. permitted housing temperature		°C	+90												
		F	194												
Ambient temperature		°C	0 to +40												
		F	32 to 104												
Lubrication			Lubricated for life												
Paint			Blue RAL 5002												
Direction of rotation			Motor and gearhead same direction												
Protection class			IP 65												
Moment of inertia (relates to the drive)	M 48 J_1	kgcm²	–	–	–	32.3	37.6	31.1	32.8	25.1	23.2	23.6	23.2	23.0	22.7
		10^{-3} in.lb.s²				28.6	33.3	27.5	29.0	22.2	20.5	20.9	20.5	20.4	20.1
Clamping hub diameter [mm]	O 60 J_1	kgcm²	175.5	137.0	115.8	–	–	–	–	–	–	–	–	–	–
		10^{-3} in.lb.s²	155.3	121.2	102.5										

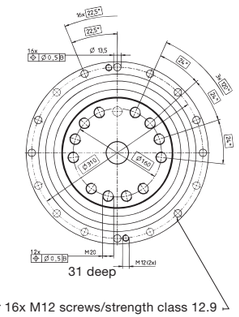
Reduced mass moments of inertia available on request.

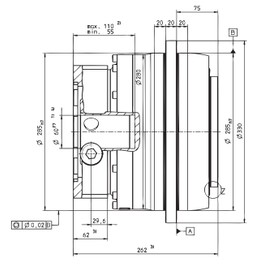
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

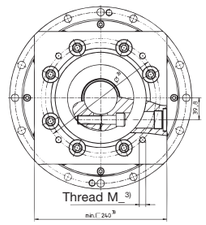
Motor shaft diameter [mm]

1-stage:

up to 60 [4] (O) clamping hub diameter

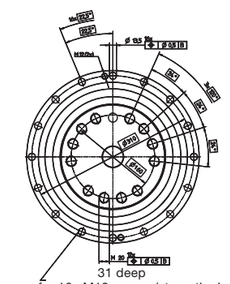


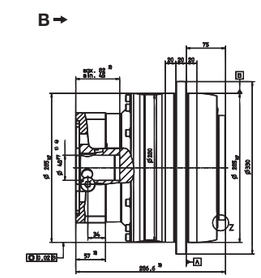


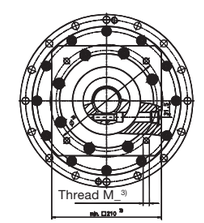


2-stage:

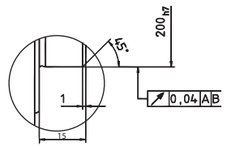
up to 48 [4] (M) clamping hub diameter







Z: Detail



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

			1-stage	2-stage				3-stage				
Ratio [a]	i		**5.5**	**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	8000	10000	10000	10000	7200	10000	10000	10000	10000	10000
		in.lb	70806	88508	88508	88508	63726	88508	88508	88508	88508	88508
Nominal output torque (with n_{1N})	T_{2N}	Nm	3500	6000	4600	4600	4700	6000	6000	6000	6000	6000
		in.lb	30978	53105	40714	40714	41599	53105	53105	53105	53105	53105
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	15000	25000	25000	25000	25000	25000	25000	25000	25000	25000
		in.lb	132762	221270	221270	221270	221270	221270	221270	221270	221270	221270
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	900	1500	1500	1500	1500	1500	1500	1500	1500	1500
Max. input speed	n_{1Max}	rpm	2500	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}	Nm	28	13	14	12	9,0	8,5	6,5	6,0	5,0	4,0
		in.lb	248	115	124	106	80	75	58	53	44	35
Max. torsional backlash	j_t	arcmin	Standard ≤ 2 / Reduced ≤ 1	Standard ≤ 3 / Reduced ≤ 1.5								
Torsional rigidity	C_{t12}	Nm/ arcmin	1650	2000	–	–	–	–	–	1500	–	1800
		in.lb/ arcmin	14603	17700						13275		15930
Tilting rigidity	C_{2K}	Nm/ arcmin	9480									
		in.lb/ arcmin	83906									
Max. axial force [c]	F_{2AMax}	N	50000									
		lb_f	11250									
Max. tilting moment	M_{2KMax}	Nm	6600	9500								
		in.lb	58415	84083								
Efficiency at full load	η	%	95	93								
Service life (For calculation, see "Technical Basics")	L_h	h	> 20000									
Weight incl. standardadapter plate	m	kg	80					89				
		lb_m	176.4					196.2				
Operating noise (with n_1 = 2000 rpm no load)	L_{PA}	dB(A)	≤ 68					≤ 67				
Max. permitted housing temperature		°C	+90									
		F	194									
Ambient temperature		°C	0 to +40									
		F	32 to 104									
Lubrication			Lubricated for life									
Paint			Blue RAL 5002									
Direction of rotation			Motor and gearhead same direction									
Protection class			IP 65									
Moment of inertia (relates to the drive)	M 48 J_1	kgcm²	–	43.8	36.9	30.5	27.0	32.7	28.3	26.7	25.2	24.4
		in.lb.s²		0.0388	0.0327	0.0270	0.0239	0.0289	0.0250	0.0236	0.0223	0.0216
Clamping hub diameter [mm]	O 60 J_1	kgcm²	175	–	–	–	–	–	–	–	–	–
		in.lb.s²	0.1549									

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

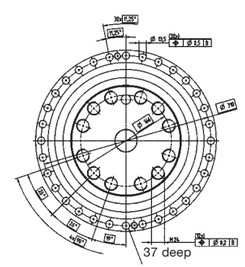
View A

View B

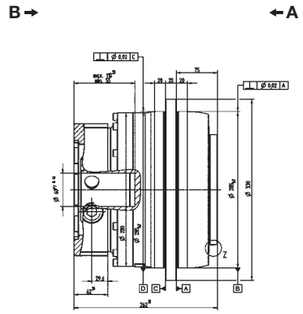
Motor shaft diameter [mm]

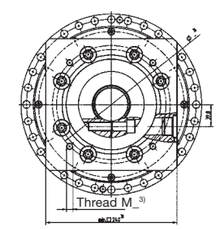
1-stage:

up to 60 [4] (O) clamping hub diameter



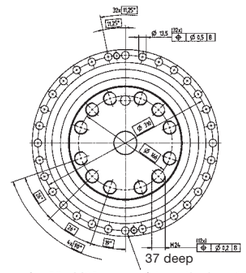
for 32x M12 screws/strength class 12.9



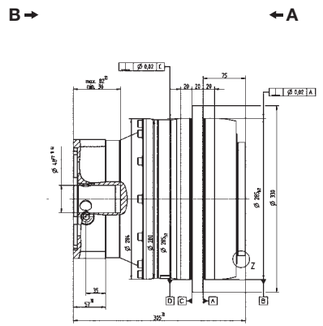


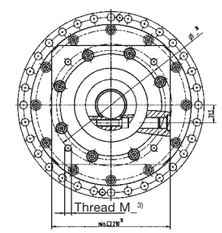
2-stage:

up to 48 [4] (M) clamping hub diameter



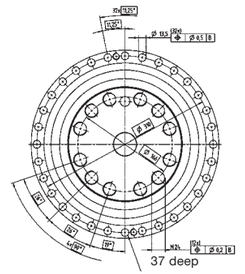
for 32x M12 screws/strength class 12.9



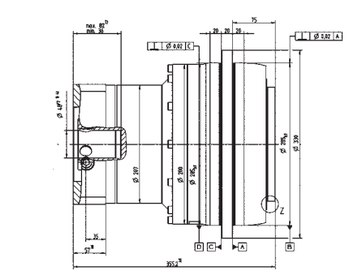


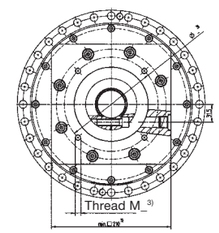
3-stage:

up to 48 [4] (M) clamping hub diameter

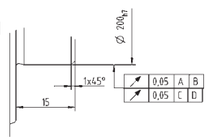


for 32x M12 screws/strength class 12.9





Z: Detail

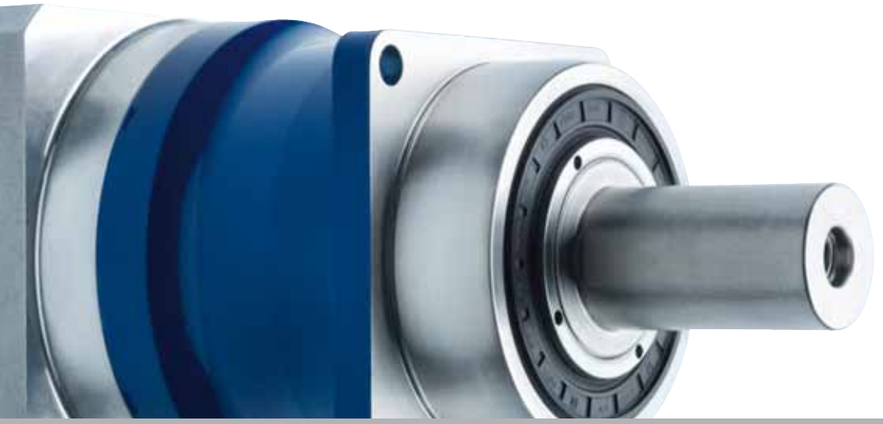


Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

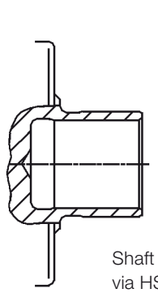
SP⁺ – The new generation

The classic all-rounder among planetary gearheads



MF version
Designed for:
- Cyclic applications
- Reverse operation
- Highly dynamic applications
- Greater positioning accuracy

MC version (HIGH SPEED)
Designed for:
- Long duty cycles (>60%)
- High nominal speeds
- Temperature-sensitive applications
- Drive trains with high control quality



NEW

Shaft mounted, mounted via HSD shrink disc

See our website and our separate flyer for more information about our washdown solutions

Sensor flange

Shrink disc

Couplings

Rack / Pinion

SP⁺

Specifications \ Version	SP⁺ MF/MC		
	+	++	+++
Positioning accuracy			
Rigidity			
Smooth-running			
Speed capacity		MF	
			MC
Power density			
Max. axial/radial forces			

Options

Output shaft with key / involute
NEW: Shaft mounted, mounted via HSD shrink disc
Washdown version
ATEX version
Food-grade grease
Version with optimized mass moment of inertia

Accessories

Rack / Pinion (see page 236)
Shrink disc (see page 202)
Couplings (see page 268)
Sensor flange

SP+ 060 MF 1-stage

				1-stage				
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm		–	58	60	54	–
		in.lb			513	531	478	
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		30	42	42	42	32
		in.lb		266	372	372	372	283
Nominal output torque (with n_{2N})	T_{2N}	Nm		17	26	26	26	17
		in.lb		150	230	230	230	150
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		80	100	100	100	80
		in.lb		708	885	885	885	708
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		3300	3300	3300	4000	4000
Max. input speed	n_{1max}	rpm		6000	6000	6000	6000	6000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		0.9	0.7	0.6	0.4	0.3
		in.lb		8.0	6.2	5.3	3.5	2.7
Max. torsional backlash	j_t	arcmin		Standard ≤ 4 / Reduced ≤ 2				
Torsional rigidity	C_{t21}	Nm/ arcmin		3.5				
		in.lb/ arcmin		31				
Max. axial force [d]	F_{2AMax}	N		2400				
		lb_f		540				
Max. radial force [d]	F_{2RMax}	N		2800				
		lb_f		630				
Max. tilting torque	M_{2KMax}	Nm		152				
		in.lb		1345				
Efficiency at full load	η	%		97				
Service life (For calculation, see the Chapter “Information”)	L_h	h		> 20000				
Weight incl. standard adapter plate	m	kg		1.9				
		lb_m		4.2				
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)		≤ 58				
Max. permitted housing temperature		°C		+90				
		F		194				
Ambient temperature		°C		0 to +40				
		F		32 to 104				
Lubrication				Lubricated for life				
Paint				Blue RAL 5002				
Direction of rotation				Motor and gearhead same direction				
Protection class				IP 65				
Moment of inertia (relates to the drive)	B	11	J_1	kgcm²	0.21	0.15	0.12	0.10	0.09
				10^{-3} in.lb.s²	0.18	0.13	0.11	0.09	0.08
Clamping hub diameter [mm]	C	14	J_1	kgcm²	0.28	0.22	0.20	0.18	0.17
				10^{-3} in.lb.s²	0.25	0.20	0.17	0.16	0.15
	E	19	J_1	kgcm²	0.61	0.55	0.52	0.50	0.49
				10^{-3} in.lb.s²	0.54	0.48	0.46	0.44	0.43

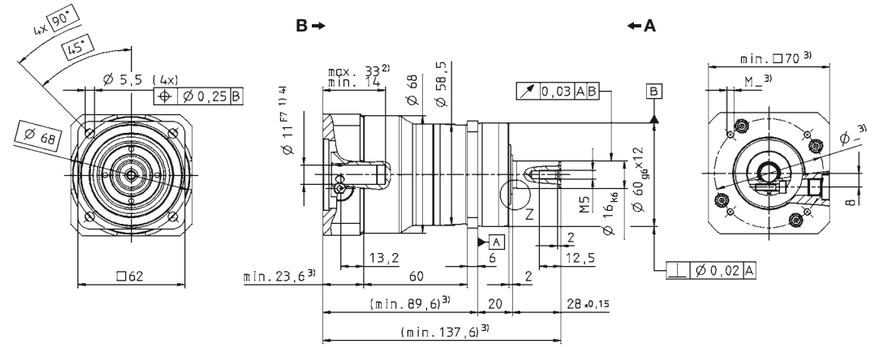
Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 14 mm
[d] Refers to center of the output shaft or flange

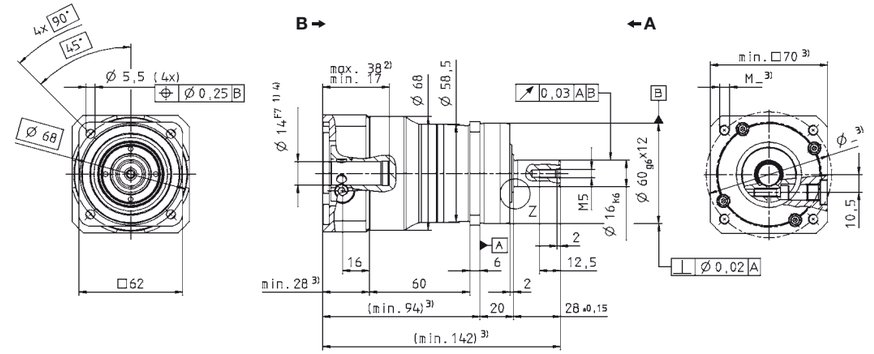
Motor shaft diameter [mm]

View A

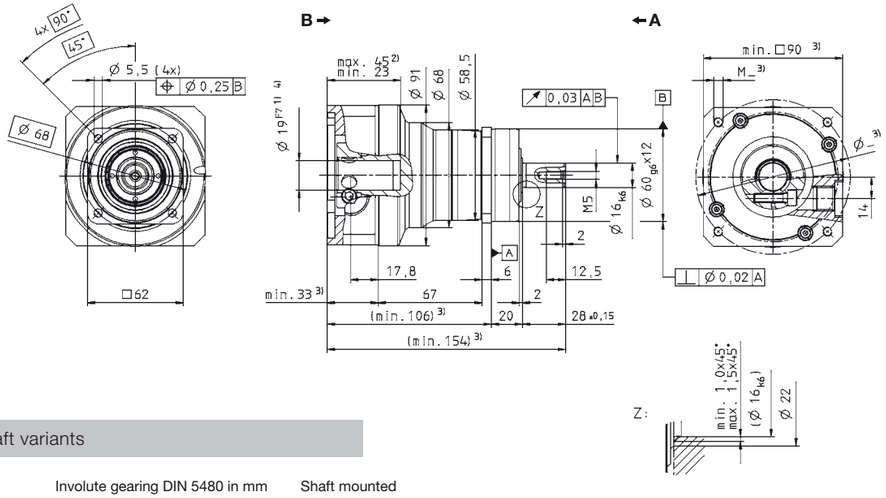
up to 11 [4] (B) clamping hub diameter



up to 14 [4] (C) clamping hub diameter[5]

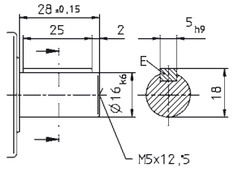


up to 19 [4] (E) clamping hub diameter

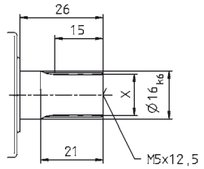


Alternatives: Output shaft variants

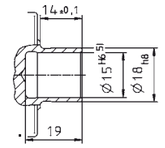
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 16 x 0.8 x 30 x 18 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 060 MF 2-stage

			2-stage								
Ratio [a]	i		**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	58	58	60	58	60	58	60	54	–
		in.lb	513	513	531	513	531	513	531	478	–
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	42	42	42	42	42	42	42	42	32
		in.lb	372	372	372	372	372	372	372	372	283
Nominal output torque (with n_{2N})	T_{2N}	Nm	26	26	26	26	26	26	26	26	17
		in.lb	230	230	230	230	230	230	230	230	150
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	100	100	100	100	100	100	100	100	80
		in.lb	885	885	885	885	885	885	885	885	708
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	4400	4400	4400	4400	4400	4400	4800	5500	5500
Max. input speed	n_{1max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2
		in.lb	4.4	3.5	3.5	2.7	2.7	2.7	2.7	2.7	1.8
Max. torsional backlash	j_t	arcmin	Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/ arcmin	3.5								
		in.lb/ arcmin	31.0								
Max. axial force [d]	F_{2AMax}	N	2400								
		lb_f	540								
Max. radial force [d]	F_{2RMax}	N	2800								
		lb_f	630								
Max. tilting moment	M_{2KMax}	Nm	152								
		in.lb	1345								
Efficiency at full load	η	%	94								
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000								
Weight incl. standard adapter plate	m	kg	2.0								
		lb_m	4.4								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 58								
Max. permitted housing temperature		°C	+90								
		F	194								
Ambient temperature		°C	0 to +40								
		F	32 to 104								
Lubrication			Lubricated for life								
Paint			Blue RAL 5002								
Direction of rotation			Motor and gearhead same direction								
Protection class			IP 65								
Moment of inertia (relates to the drive) B 11	J_1	kgcm²	0.077	0.069	0.068	0.061	0.061	0.057	0.057	0.056	0.056
		10^{-3} in.lb.s²	0.068	0.061	0.060	0.054	0.054	0.050	0.050	0.050	0.050
Clamping hub diameter [mm] C 14	J_1	kgcm²	0.17	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15
		10^{-3} in.lb.s²	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13

Reduced mass moments of inertia available on request.

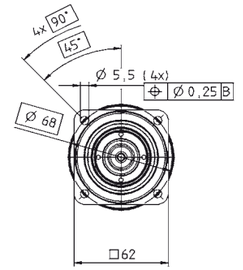
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 11 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

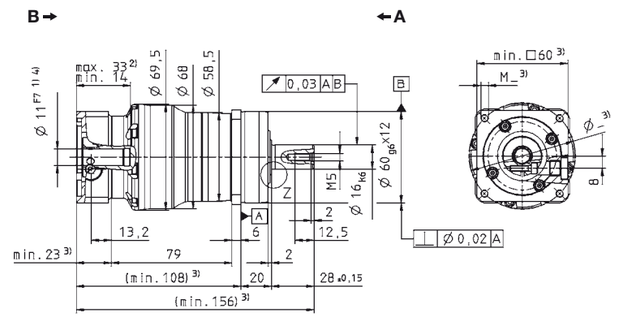
up to 11 [4] (B) clamping hub diameter

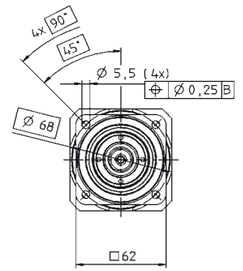
up to 14 [4] (C) clamping hub diameter

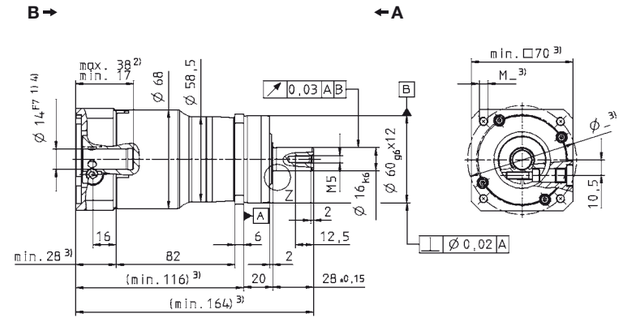
View A

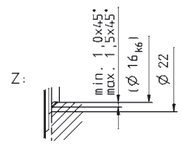


View B



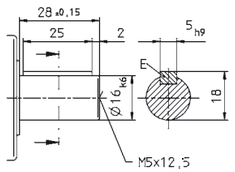




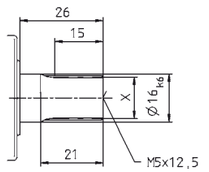


Alternatives: Output shaft variants

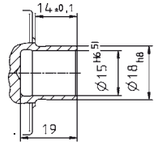
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 16 x 0.8 x 30 x 18 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 075 MF 1-stage

			1-stage				
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	–	142	160	142	100
		in.lb	–	1254	1416	1254	883
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	85	110	110	110	95
		in.lb	752	974	974	974	841
Nominal output torque (with n_{2N})	T_{2N}	Nm	47	75	75	75	52
		in.lb	416	664	664	664	460
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	200	250	250	250	200
		in.lb	1770	2213	2213	2213	1770
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	2900	2900	2900	3100	3100
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	1.8	1.4	1.1	0.8	0.6
		in.lb	15.9	12.4	9.7	7.1	5.3
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2				
Torsional rigidity	C_{t21}	Nm/ arcmin	10				
		in.lb/ arcmin	89				
Max. axial force [d]	F_{2AMax}	N	3350				
		lb_f	754				
Max. radial force [d]	F_{2RMax}	N	4200				
		lb_f	945				
Max. tilting moment	M_{2KMax}	Nm	236				
		in.lb	2089				
Efficiency at full load	η	%	97				
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000				
Weight incl. standardadapter plate	m	kg	3.9				
		lb_m	8.6				
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 59				
Max. permitted housing temperature		°C	+90				
		F	194				
Ambient temperature		°C	0 to +40				
		F	32 to 104				
Lubrication			Lubricated for life				
Paint			Blue RAL 5002				
Direction of rotation			Motor and gearhead same direction				
Protection class			IP 65				
Moment of inertia (relates to the drive)	C 14	J_1	kgcm²	0.86	0.61	0.51	0.42	0.38
			10^{-3} in.lb.s²	0.76	0.54	0.46	0.37	0.33
Clamping hub diameter [mm]	E 19	J_1	kgcm²	1.03	0.78	0.68	0.59	0.54
			10^{-3} in.lb.s²	0.91	0.69	0.60	0.52	0.48
	G 24	J_1	kgcm²	2.40	2.15	2.05	1.96	1.91
			10^{-3} in.lb.s²	2.12	1.90	1.81	1.73	1.69

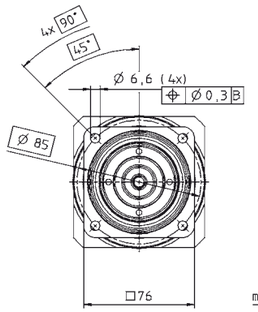
Reduced mass moments of inertia available on request.

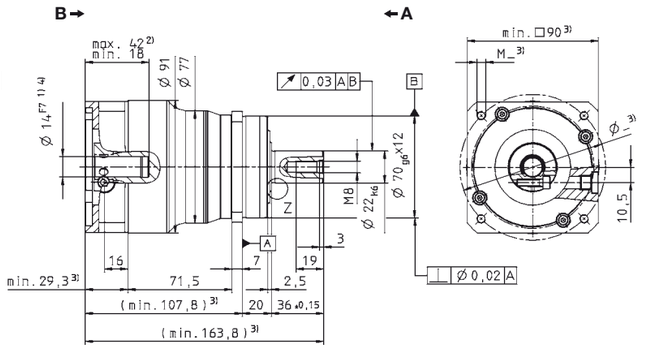
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to centre of the output shaft or flange

Motor shaft diameter [mm]

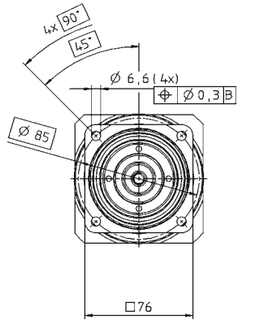
View A

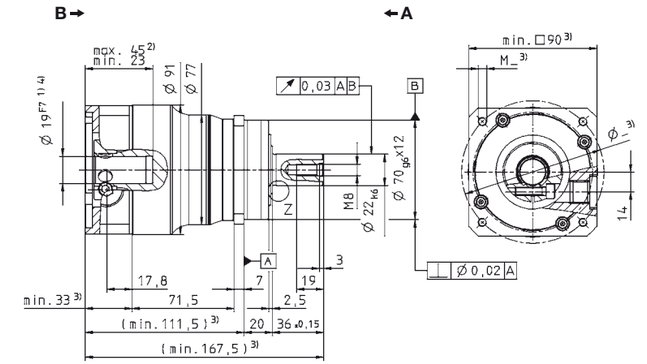
up to 14 [4] (C) clamping hub diameter



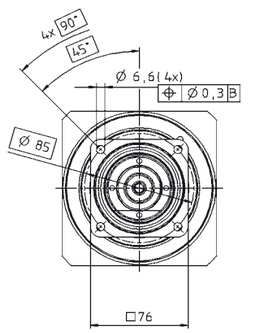


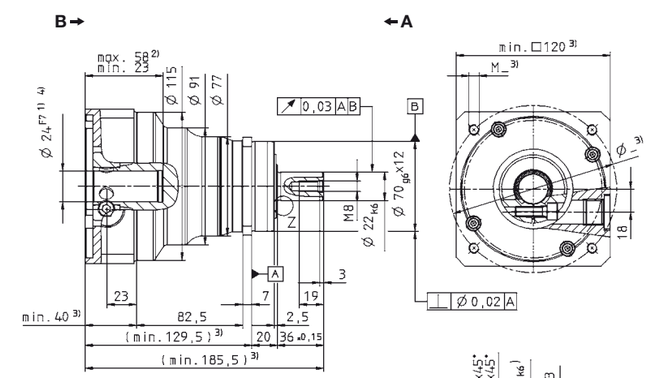
up to 19 [4] (E) clamping hub diameter





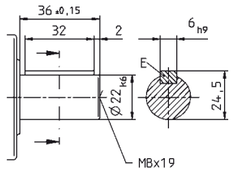
up to 24 [4] (G) clamping hub diameter



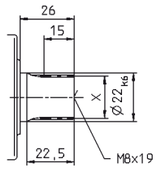


Alternatives: Output shaft variants

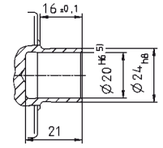
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 16 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 075 MF 2-stage

				2-stage								
Ratio [a]	i			**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm		142	142	160	142	160	135	160	142	100
		in.lb		1254	1254	1416	1254	1416	1195	1416	1254	883
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		110	110	110	110	110	110	110	110	90
		in.lb		974	974	974	974	974	974	974	974	797
Nominal output torque (with n_{2N})	T_{2N}	Nm		75	75	75	75	75	75	75	75	52
		in.lb		664	664	664	664	664	664	664	664	460
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		250	250	250	250	250	250	250	250	200
		in.lb		2213	2213	2213	2213	2213	2213	2213	2213	1770
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		3500	3500	3500	3500	3500	3500	3800	4500	4500
Max. input speed	n_{1Max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		0.8	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.3
		in.lb		4.4	3.5	3.5	2.7	2.7	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin		Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/ arcmin		10								
		in.lb/ arcmin		89								
Max. axial force [d]	F_{2AMax}	N		3350								
		lb_f		754								
Max. radial force [d]	F_{2RMax}	N		4200								
		lb_f		945								
Max. tilting moment	M_{2KMax}	Nm		236								
		in.lb		2089								
Efficiency at full load	η	%		94								
Service life (For calculation, see the Chapter "Information")	L_h	h		> 20000								
Weight incl. standard adapter plate	m	kg		3.6								
		lb_m		8.0								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 59								
Max. permitted housing temperature		°C		+90								
		F		194								
Ambient temperature		°C		0 to +40								
		F		32 to 104								
Lubrication				Lubricated for life								
Paint				Blue RAL 5002								
Direction of rotation				Motor and gearhead same direction								
Protection class				IP 65								
Moment of inertia (relates to the drive)	B	11	J_1	kgcm²	0.16	0.13	0.13	0.10	0.10	0.091	0.090	0.089	0.089
				10^{-3} in.lb.s²	0.14	0.11	0.11	0.092	0.090	0.081	0.080	0.079	0.079
Clamping hub diameter [mm]	C	14	J_1	kgcm²	0.23	0.20	0.20	0.18	0.18	0.17	0.16	0.16	0.16
				10^{-3} in.lb.s²	0.20	0.18	0.18	0.16	0.16	0.15	0.15	0.14	0.14
	E	19	J_1	kgcm²	0.55	0.53	0.52	0.50	0.50	0.49	0.49	0.49	0.49
				10^{-3} in.lb.s²	0.49	0.47	0.46	0.44	0.44	0.43	0.43	0.43	0.43

Reduced mass moments of inertia available on request.

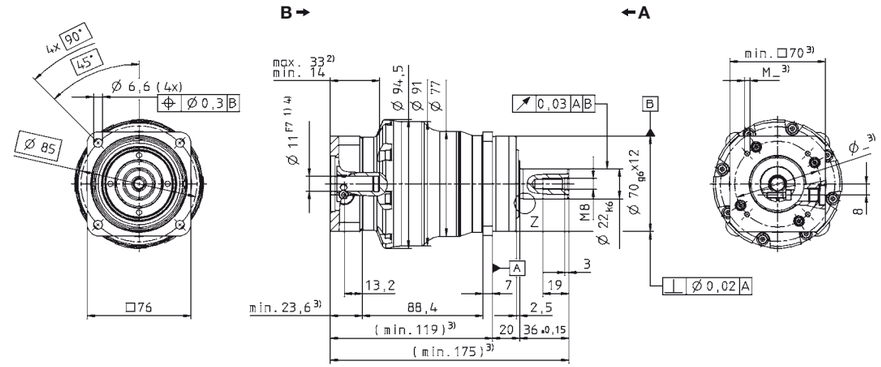
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 14 mm
[d] Refers to centre of the output shaft or flange

Motor shaft diameter [mm]

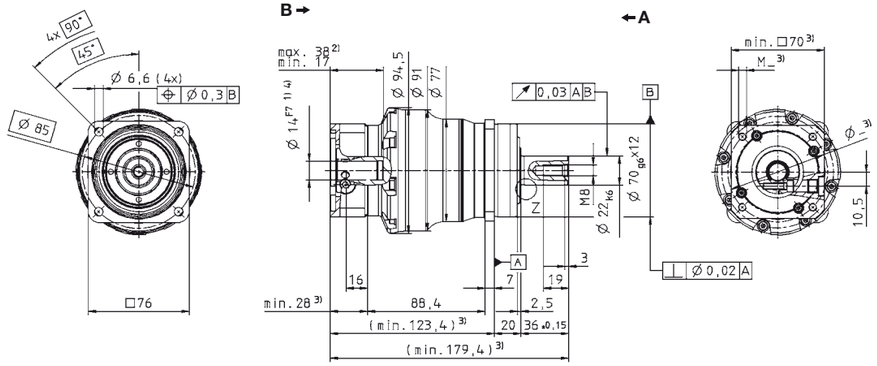
View A

View B

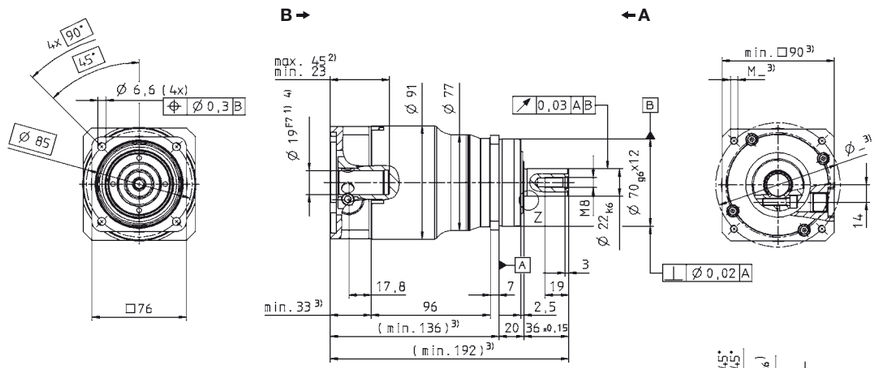
up to 11 [4] (B) clamping hub diameter



up to 14 [4] (C) clamping hub diameter

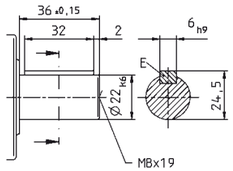


up to 19 [4] (E) clamping hub diameter

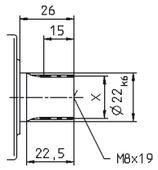


Alternatives: Output shaft variants

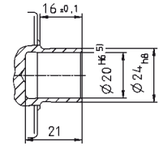
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 16 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 100 MF 1-stage

				1-stage				
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}		Nm	–	370	400	330	260
			in.lb	–	3275	3540	2921	2301
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	235	315	315	315	235
			in.lb	2080	2788	2788	2788	2080
Nominal output torque (with n_{1N})	T_{2N}		Nm	120	180	175	170	120
			in.lb	1062	1593	1549	1505	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	500	625	625	625	500
			in.lb	4425	5531	5531	5531	4425
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}		rpm	2500	2500	2500	2800	2800
Max. input speed	n_{1Max}		rpm	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}		Nm	3.5	2.7	2.4	1.6	1.4
			in.lb	31.0	23.9	21.2	14.2	12.4
Max. torsional backlash	j_t		arcmin	Standard ≤ 3 / Reduced ≤ 1				
Torsional rigidity	C_{t21}		Nm/ arcmin	31				
			in.lb/ arcmin	274				
Max. axial force [d]	F_{2AMax}		N	5650				
			lb_f	1271				
Max. radial force [d]	F_{2RMax}		N	6600				
			lb_f	1485				
Max. tilting moment	M_{2KMax}		Nm	487				
			in.lb	4310				
Efficiency at full load	η		%	97				
Service life (For calculation, see the Chapter “Information”)	L_h		h	> 20000				
Weight incl. standard adapter plate	m		kg	7.7				
			lb_m	17.0				
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}		dB(A)	≤ 64				
Max. permitted housing temperature			°C	+90				
			F	17.0				
Ambient temperature			°C	0 to +40				
			F	32 to 104				
Lubrication				Lubricated for life				
Paint				Blue RAL 5002				
Direction of rotation				Motor and gearhead same direction				
Protection class				IP 65				
Moment of inertia (relates to the drive)	E	19	J_1	kgcm²	3.29	2.35	1.92	1.60	1.38
				10^{-3} in.lb.s²	2.91	2.08	1.70	1.42	1.22
Clamping hub diameter [mm]	G	24	J_1	kgcm²	3.99	3.04	2.61	2.29	2.07
				10^{-3} in.lb.s²	3.53	2.69	2.31	2.03	1.83
	H	28	J_1	kgcm²	3.01	2.53	2.17	1.89	1.68
				10^{-3} in.lb.s²	2.66	2.24	1.92	1.67	1.48
	K	38	J_1	kgcm²	11.1	10.1	9.68	9.36	9.14
				10^{-3} in.lb.s²	9.78	8.95	8.57	8.28	8.09

Reduced mass moments of inertia available on request.

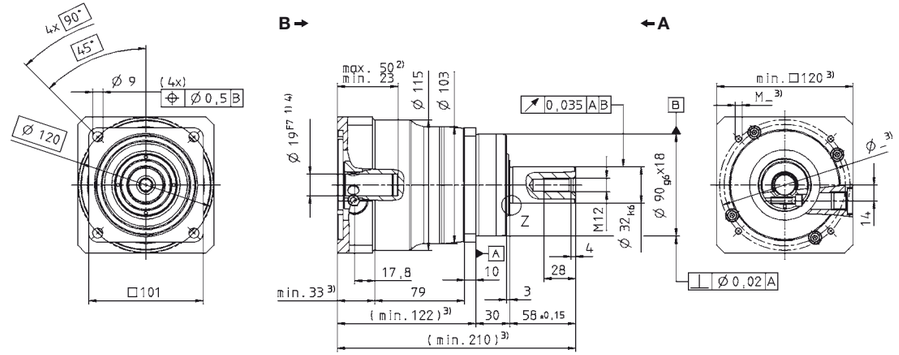
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 24 mm
[d] Refers to centre of the output shaft or flange

Motor shaft diameter [mm]

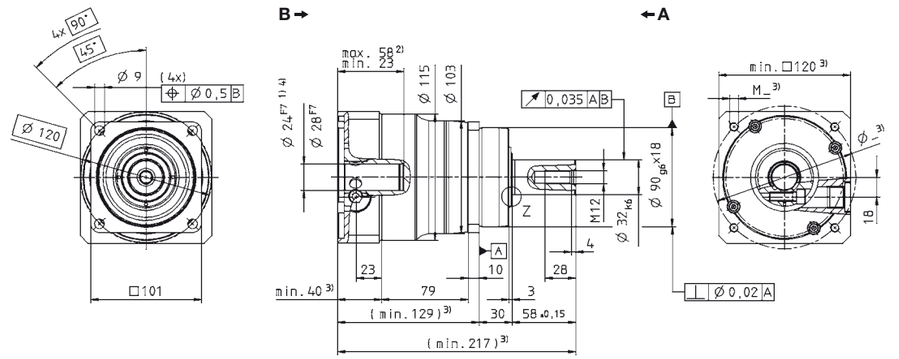
View A

View B

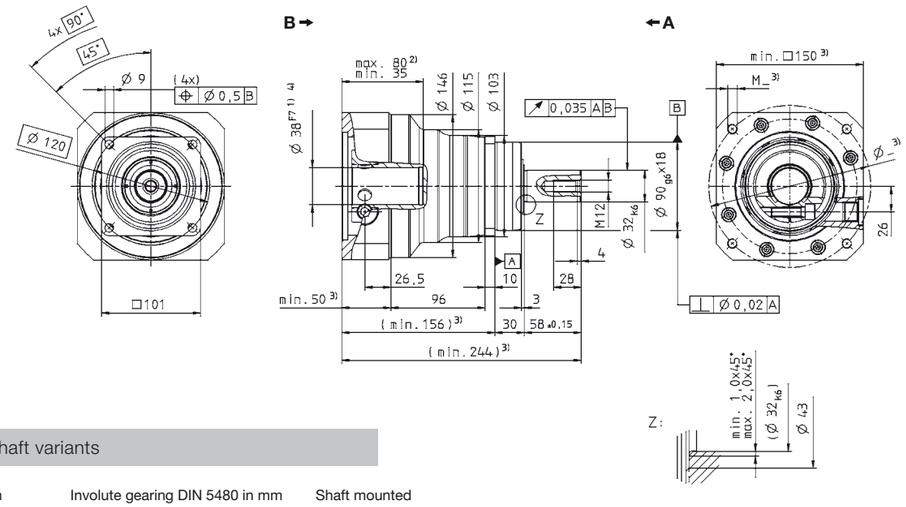
up to 19 [4] (E) clamping hub diameter



up to 24/28 [4] (G/H) clamping hub diameter

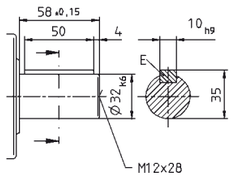


up to 38 [4] (K) clamping hub diameter

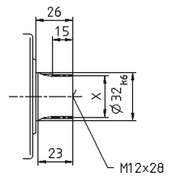


Alternatives: Output shaft variants

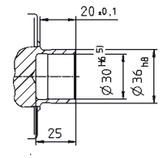
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 32 x 1.25 x 30 x 24 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 100 MF 2-stage

				2-stage								
Ratio [a]	i			**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm		370	370	400	370	400	370	400	330	260
		in.lb		3275	3275	3540	3275	3540	3275	3540	2921	2301
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		315	315	315	315	315	315	315	315	235
		in.lb		2788	2788	2788	2788	2788	2788	2788	2788	2080
Nominal output torque (with n_{2N})	T_{2N}	Nm		180	180	175	180	175	180	175	170	120
		in.lb		1593	1593	1549	1593	1549	1593	1549	1505	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		625	625	625	625	625	625	625	625	500
		in.lb		5531	5531	5531	5531	5531	5531	5531	5531	4425
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		3100	3100	3100	3100	3100	3100	3500	4200	4200
Max. input speed	n_{1Max}	rpm		4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		1.5	1.2	1.1	0.9	0.8	0.7	0.6	0.5	0.5
		in.lb		13.3	10.6	9.7	8.8	7.1	6.2	5.3	4.4	4.4
Max. torsional backlash	j_t	arcmin		Standard ≤ 5 / Reduced ≤ 3								
Torsional rigidity	C_{t21}	Nm/ arcmin		31								
		in.lb/ arcmin		274								
Max. axial force [d]	F_{2AMax}	N		5650								
		lb_f		1271								
Max. radial force [d]	F_{2RMax}	N		6600								
		lb_f		1485								
Max. tilting moment	M_{2KMax}	Nm		487								
		in.lb		4310								
Efficiency at full load	η	%		94								
Service life (For calculation, see the Chapter "Information")	L_h	h		> 20000								
Weight incl. standardadapter plate	m	kg		7.9								
		lb_m		17.5								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 60								
Max. permitted housing temperature		°C		+90								
		F		194								
Ambient temperature		°C		0 to +40								
		F		32 to 104								
Lubrication				Lubricated for life								
Paint				Blue RAL 5002								
Direction of rotation				Motor and gearhead same direction								
Protection class				IP 65								
Moment of inertia (relates to the drive)	C	14	J_1	kgcm²	0.64	0.54	0.52	0.43	0.43	0.38	0.38	0.37	0.37
				10^{-3} in.lb.s²	0.57	0.47	0.46	0.38	0.38	0.34	0.33	0.33	0.33
Clamping hub diameter [mm]	E	19	J_1	kgcm²	0.81	0.70	0.69	0.60	0.59	0.55	0.54	0.54	0.54
				10^{-3} in.lb.s²	0.72	0.62	0.61	0.53	0.52	0.48	0.48	0.48	0.47
	G	24	J_1	kgcm²	2.18	2.07	2.05	1.97	1.96	1.92	1.91	1.91	1.91
				10^{-3} in.lb.s²	1.93	1.83	1.82	1.74	1.74	1.70	1.69	1.69	1.69

Reduced mass moments of inertia available on request.

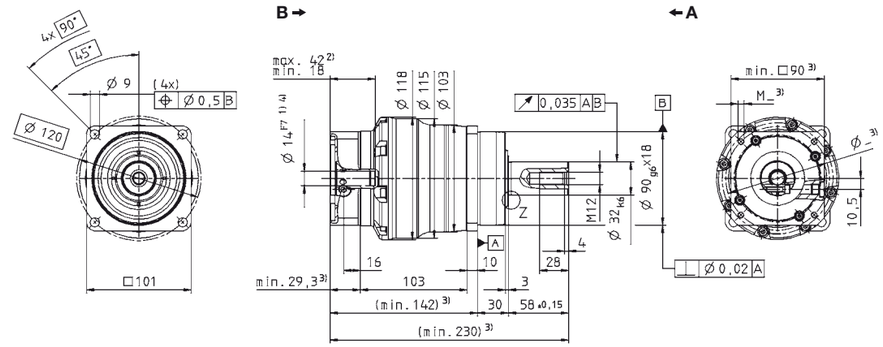
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to centre of the output shaft or flange

Motor shaft diameter [mm]

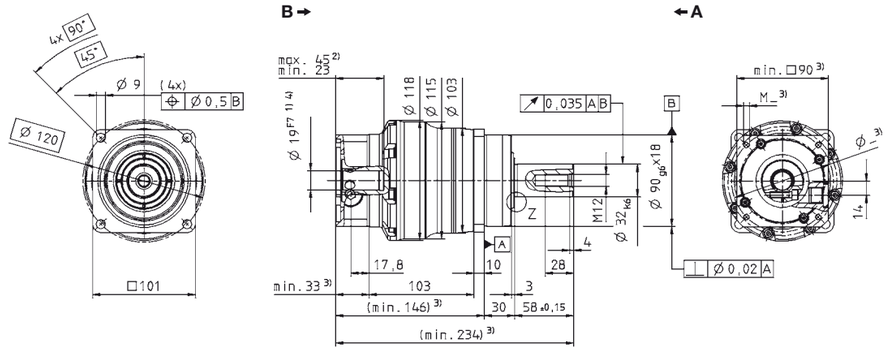
View A

View B

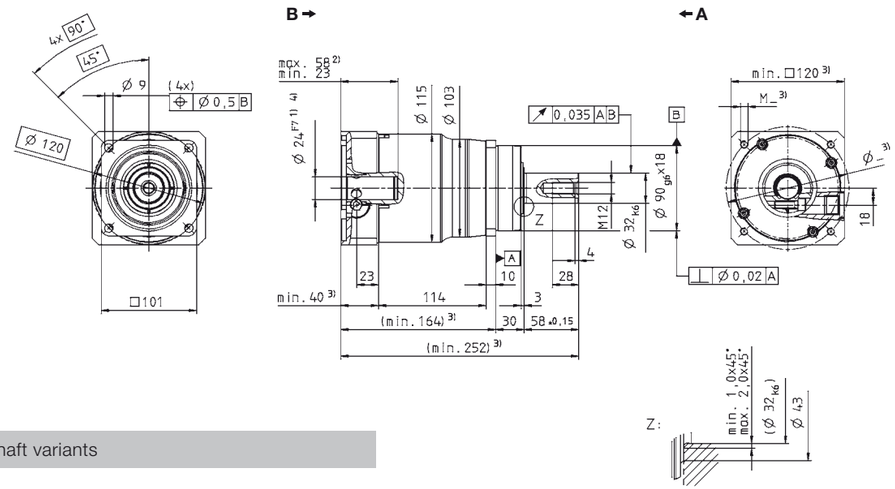
up to 14 [4] (C) clamping hub diameter



up to 19 [4] (E) clamping hub diameter

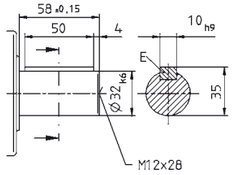


up to 24 [4] (G) clamping hub diameter

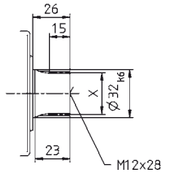


Alternatives: Output shaft variants

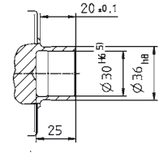
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 32 x 1.25 x 30 x 24 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 140 MF 1-stage

				1-stage				
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm		–	710	755	680	560
		in.lb		–	6284	6682	6018	4956
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		390	660	660	660	530
		in.lb		3451.5	5841	5841	5841	4691
Nominal output torque (with n_{2N})	T_{2N}	Nm		200	360	360	360	220
		in.lb		1770	3186	3186	3186	1947
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		1000	1250	1250	1250	1000
		in.lb		8850	11063	11063	11063	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		2100	2100	2100	2600	2600
Max. input speed	n_{1Max}	rpm		4000	4000	4000	4000	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		7.6	5.8	4.7	3.4	2.5
		in.lb		67	51	42	30	22
Max. torsional backlash	j_t	arcmin		Standard ≤ 3 / Reduced ≤ 1				
Torsional rigidity	C_{t21}	Nm/ arcmin		53				
		in.lb/ arcmin		469				
Max. axial force [d]	F_{2AMax}	N		9870				
		lb_f		2221				
Max. radial force [d]	F_{2RMax}	N		9900				
		lb_f		2228				
Max. tilting moment	M_{2KMax}	Nm		952				
		in.lb		8425				
Efficiency at full load	η	%		97				
Service life (For calculation, see the Chapter "Information")	L_h	h		> 20000				
Weight incl. standard adapter plate	m	kg		17.2				
		lb_m		38.0				
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)		≤ 65				
Max. permitted housing temperature		°C		+90				
		F		194				
Ambient temperature		°C		0 to +40				
		F		32 to 104				
Lubrication				Lubricated for life				
Paint				Blue RAL 5002				
Direction of rotation				Motor and gearhead same direction				
Protection class				IP 65				
Moment of inertia (relates to the drive)	G	24	J_1	kgcm²	10.7	7.82	6.79	5.84	5.28
				10^{-3} in.lb.s²	9.45	6.92	6.01	5.17	4.67
Clamping hub diameter [mm]	I	32	J_1	kgcm²	13.8	11.0	9.95	9.01	8.44
				10^{-3} in.lb.s²	12.3	9.72	8.81	7.97	7.47
	K	38	J_1	kgcm²	14.9	12.1	11.0	10.1	9.51
				10^{-3} in.lb.s²	13.2	10.7	9.76	8.92	8.42
	M	48	J_1	kgcm²	29.5	26.7	25.6	24.7	24.2
				10^{-3} in.lb.s²	26.1	23.6	22.7	21.9	21.4

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 38 mm
[d] Refers to center of the output shaft or flange

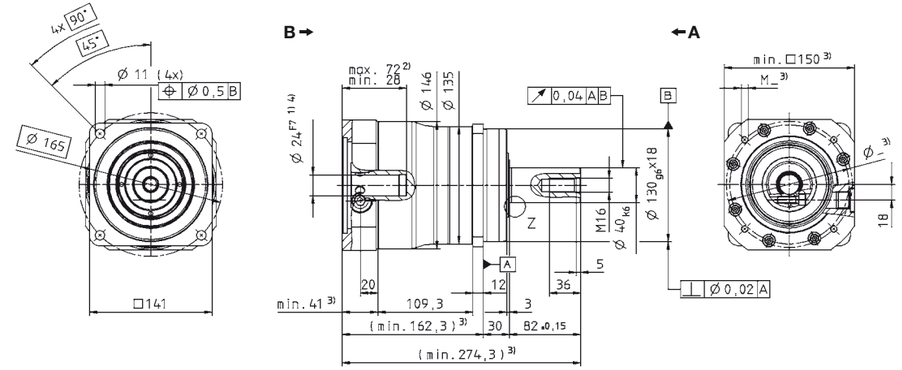
WITTENSTEIN

Motor shaft diameter [mm]

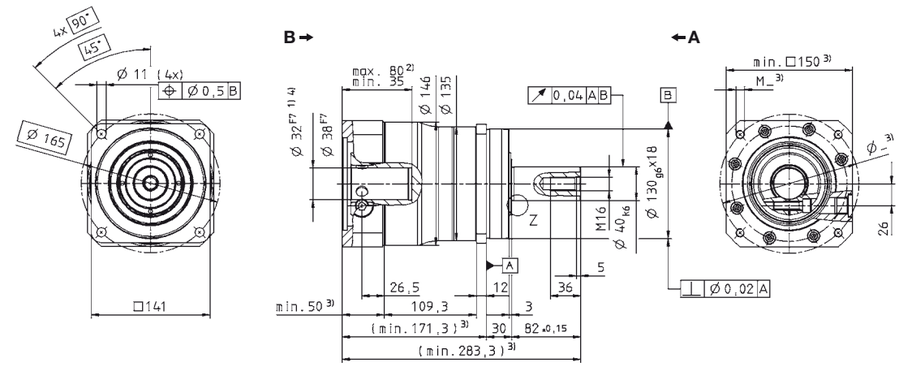
View A

View B

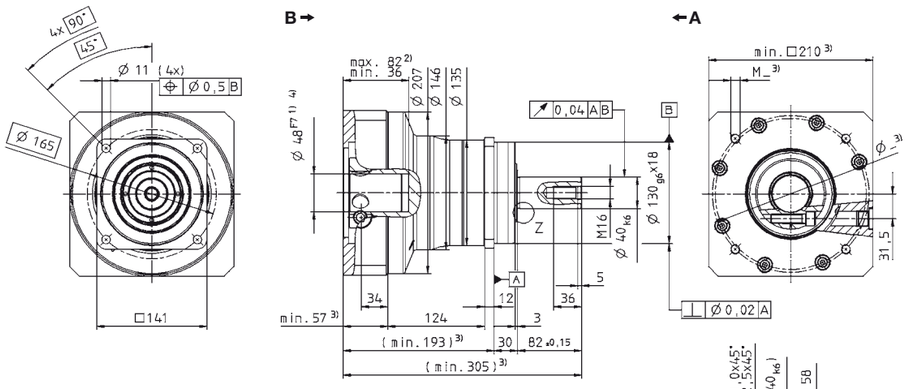
up to 24 [4] (G) clamping hub diameter



up to 32/38 [4] (I/K) clamping hub diameter

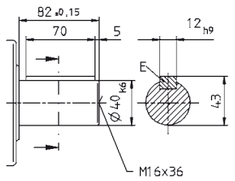


up to 48 [4] (M) clamping hub diameter

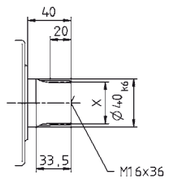


Alternatives: Output shaft variants

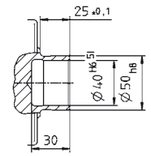
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 40 x 2 x 30 x 18 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 140 MF 2-stage

				2-stage								
Ratio [a]	i			**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm		710	710	755	710	755	710	755	680	560
		in.lb		6284	6284	6682	6284	6682	6284	6682	6018	4956
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		660	660	660	660	660	660	660	660	530
		in.lb		5841	5841	5841	5841	5841	5841	5841	5841	4691
Nominal output torque (with n_{2N})	T_{2N}	Nm		360	360	360	360	360	360	360	360	220
		in.lb		3186	3186	3186	3186	3186	3186	3186	3186	1947
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		1250	1250	1250	1250	1250	1250	1250	1250	1000
		in.lb		11063	11063	11063	11063	11063	11063	11063	11063	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		2900	2900	2900	2900	2900	2900	3200	3200	3900
Max. input speed	n_{1Max}	rpm		4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		3.3	2.7	2.4	1.9	1.8	1.4	1.3	1.2	1.1
		in.lb		29.2	23.9	21.2	16.9	15.9	12.4	11.5	10.6	9.7
Max. torsional backlash	j_t	arcmin		Standard ≤ 5 / Reduced ≤ 3								
Torsional rigidity	C_{t21}	Nm/ arcmin		53								
		in.lb/ arcmin		469								
Max. axial force [d]	F_{2AMax}	N		9870								
		lb_f		2221								
Max. radial force [d]	F_{2RMax}	N		9900								
		lb_f		2228								
Max. tilting moment	M_{2KMax}	Nm		952								
		in.lb		8425								
Efficiency at full load	η	%		94								
Service life (For calculation, see the Chapter "Information")	L_h	h		> 20000								
Weight incl. standard adapter plate	m	kg		17								
		lb_m		37.6								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 63								
Max. permitted housing temperature		°C		+90								
		F		194								
Ambient temperature		°C		0 to +40								
		F		32 to 104								
Lubrication				Lubricated for life								
Paint				Blue RAL 5002								
Direction of rotation				Motor and gearhead same direction								
Protection class				IP 65								
Moment of inertia (relates to the drive)	E	19	J_1	kgcm²	2.50	2.01	1.97	1.65	1.63	1.40	1.39	1.38	1.38
				10⁻³ in.lb.s²	2.21	1.78	1.75	1.46	1.44	1.24	1.23	1.22	1.22
Clamping hub diameter [mm]	G	24	J_1	kgcm²	3.19	2.71	2.67	2.34	2.32	2.10	2.08	2.08	2.07
				10⁻³ in.lb.s²	2.82	2.40	2.36	2.07	2.05	1.85	1.85	1.84	1.83
	K	38	J_1	kgcm²	10.3	9.77	9.73	9.41	9.39	9.16	9.15	9.14	9.14
				10⁻³ in.lb.s²	9.07	8.65	8.61	8.33	8.31	8.11	8.10	8.09	8.09

Reduced mass moments of inertia available on request.

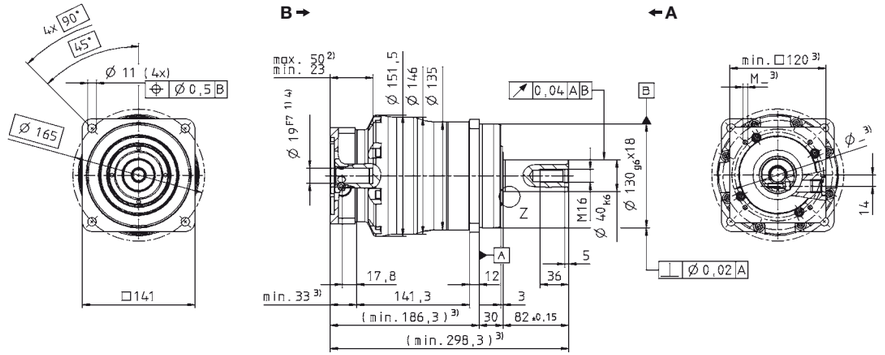
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 24 mm
[d] Refers to center of the output shaft or flange

View A

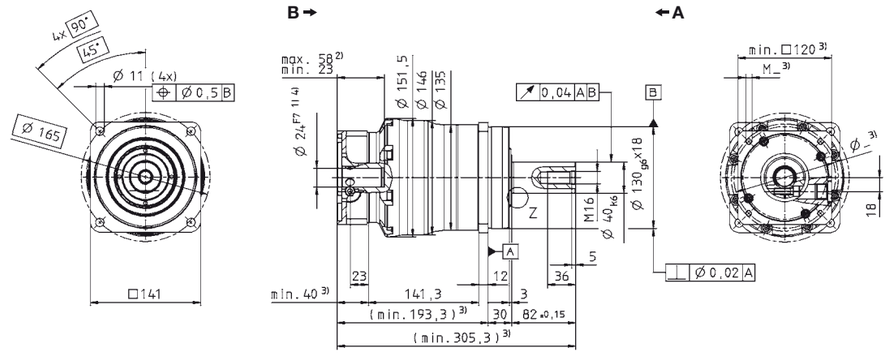
View B

Motor shaft diameter [mm]

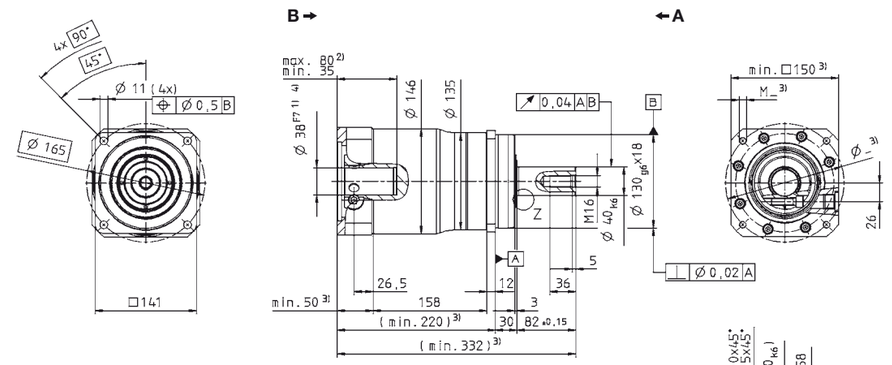
up to 19 [4] (E) clamping hub diameter



up to 24 [4] (G) clamping hub diameter

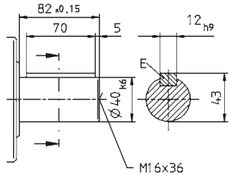


up to 38 [4] (K) clamping hub diameter

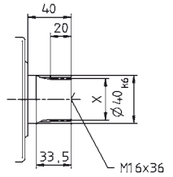


Alternatives: Output shaft variants

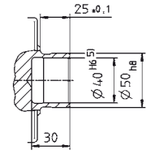
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 40 x 2 x 30 x 18 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 180 MF 1-stage

			1-stage				
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	–	1785	1890	1785	1400
		in.lb	–	15797	16727	15797	12390
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	970	1210	1210	1210	970
		in.lb	8585	10709	10709	10709	8585
Nominal output torque (with n_{2N})	T_{2N}	Nm	530	750	750	750	750
		in.lb	4691	6638	6638	6638	6638
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	2200	2750	2750	2750	2200
		in.lb	19470	24338	24338	24338	29470
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	1500	1500	1500	2300	2300
Max. input speed	n_{1Max}	rpm	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	14.0	11.0	9.0	6.8	5.0
		in.lb	123.9	97.4	79.7	60.2	44.3
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1				
Torsional rigidity	C_{t21}	Nm/ arcmin	175				
		in.lb/ arcmin	1549				
Max. axial force [d]	F_{2AMax}	N	14150				
		lb_f	3184				
Max. radial force [d]	F_{2RMax}	N	15400				
		lb_f	3465				
Max. tilting moment	M_{2KMax}	Nm	1600				
		in.lb	14160				
Efficiency at full load	η	%	97				
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				
Weight incl. standard adapter plate	m	kg	34				
		lb_m	75.1				
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 66				
Max. permitted housing temperature		°C	+90				
		F	194				
Ambient temperature		°C	0 to +40				
		F	32 to 104				
Lubrication			Lubricated for life				
Paint			Blue RAL 5002				
Direction of rotation			Motor and gearhead same direction				
Protection class			IP 65				
Moment of inertia (relates to the drive) K 38	J_1	kgcm²	50.8	33.9	27.9	22.2	19.2
		10⁻³ in.lb.s²	45.0	30.0	24.7	19.7	17.0
Clamping hub diameter [mm] M 48	J_1	kgcm²	58.2	41.2	35.3	29.6	26.5
		10⁻³ in.lb.s²	51.5	36.5	31.2	26.2	23.5

Reduced mass moments of inertia available on request.

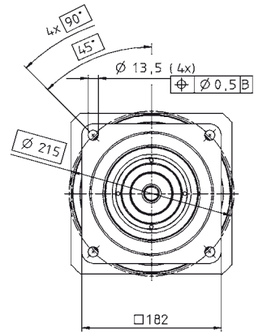
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 48 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

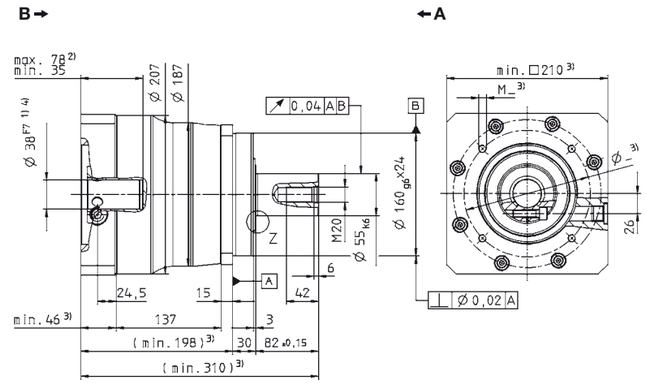
up to 38 [4] (K) clamping hub diameter

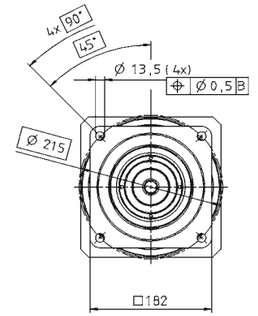
up to 48 [4] (M) clamping hub diameter

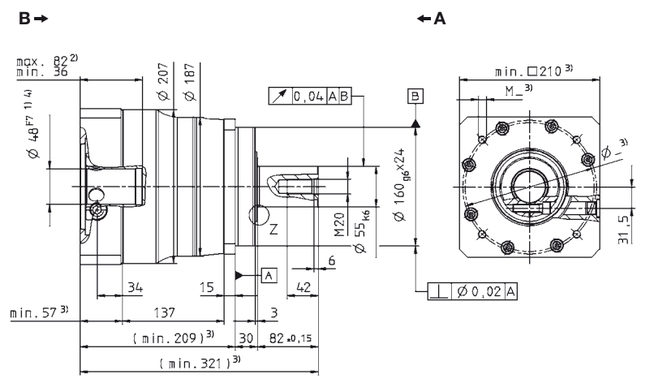
View A

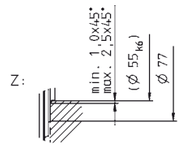


View B



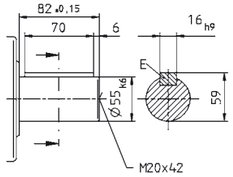




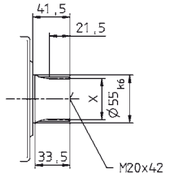


Alternatives: Output shaft variants

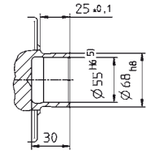
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 55 x 2 x 30 x 26 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 180 MF 2-stage

			2-stage								
Ratio [a]	i		**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	1785	1785	1890	1785	1890	1785	1800	1785	1400
		in.lb	15797	15797	16727	15797	16727	15797	15930	15797	12390
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1210	1210	1210	1210	1210	1210	1210	1210	970
		in.lb	10709	10709	10709	10709	10709	10709	10709	10709	8585
Nominal output torque (with n_{2N})	T_{2N}	Nm	750	750	750	750	750	750	750	750	750
		in.lb	6638	6638	6638	6638	6638	6638	6637	6638	6638
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	2750	2750	2750	2750	2750	2750	2750	2750	2200
		in.lb	24338	24338	24338	24338	24338	24338	24338	24338	19470
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	2700	2700	2700	2700	2700	2700	2900	3200	3400
Max. input speed	n_{1Max}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	5.3	4.3	3.9	3.1	2.8	2.3	2.1	1.9	1.7
		in.lb	46,9	38,1	34,5	27,4	24,8	20,4	18,6	16,8	15,0
Max. torsional backlash	j_t	arcmin	Standard ≤ 5 / Reduced ≤ 3								
Torsional rigidity	C_{t21}	Nm/ arcmin	175								
		in.lb/ arcmin	1549								
Max. axial force [d]	F_{2AMax}	N	14150								
		lb_f	3184								
Max. radial force [d]	F_{2RMax}	N	15400								
		lb_f	3465								
Max. tilting moment	M_{2KMax}	Nm	1600								
		in.lb	14160								
Efficiency at full load	η	%	94								
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000								
Weight incl. standard adapter plate	m	kg	36.4								
		lb_m	80.4								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66								
Max. permitted housing temperature		°C	+90								
		F	194								
Ambient temperature		°C	0 to +40								
		F	32 to 104								
Lubrication			Lubricated for life								
Paint			Blue RAL 5002								
Direction of rotation			Motor and gearhead same direction								
Protection class			IP 65								
Moment of inertia (relates to the drive)	G	24	J_1	kgcm²	9.27	7.72	7.48	6.32	6.20	5.51	5.45	5.39	5.36
				10^{-3} in.lb.s²	8.20	6.83	6.62	5.59	5.49	4.88	4.82	4.77	4.74
Clamping hub diameter [mm]	I	32	J_1	kgcm²	12.4	10.9	10.6	9.48	9.36	8.67	8.61	8.55	8.52
				10^{-3} in.lb.s²	11.0	9.63	9.42	8.39	8.28	7.67	7.62	7.57	7.54
	K	38	J_1	kgcm²	13.5	12.0	11.7	10.6	10.4	9.74	9.68	9.63	9.60
				10^{-3} in.lb.s²	12.0	10.6	10.4	9.34	9.23	8.62	8.57	8.52	8.49
	M	48	J_1	kgcm²	28.1	26.6	26.3	25.2	25.1	24.4	24.3	24.3	24.3
				10^{-3} in.lb.s²	24.9	23.5	23.3	22.3	22.2	21.6	21.5	21.5	21.5

Reduced mass moments of inertia available on request.

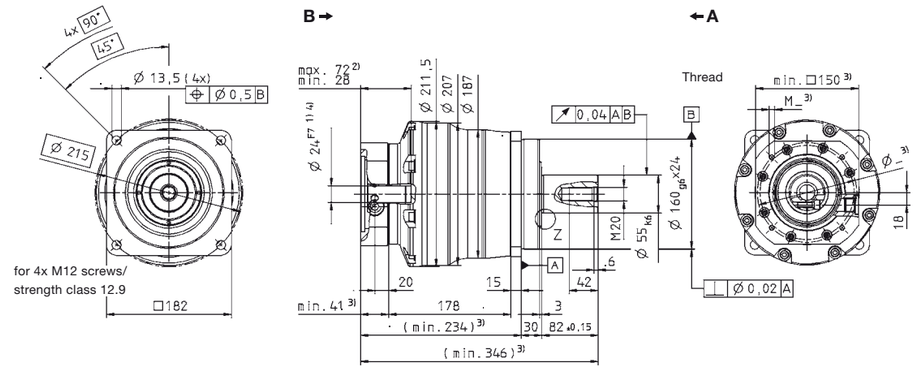
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 38 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

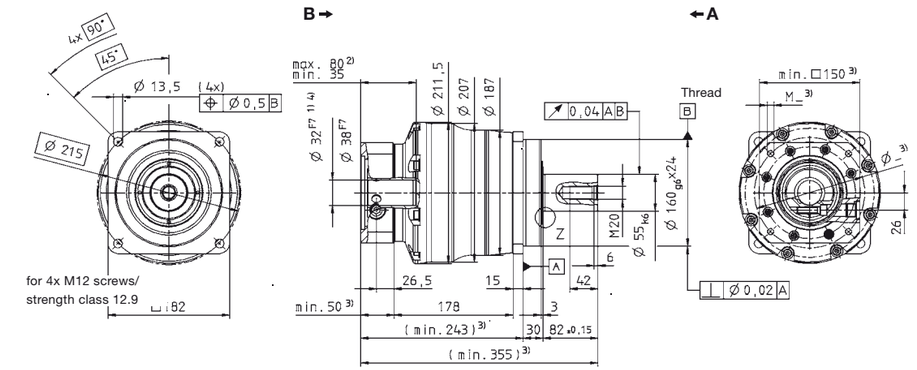
View A

View B

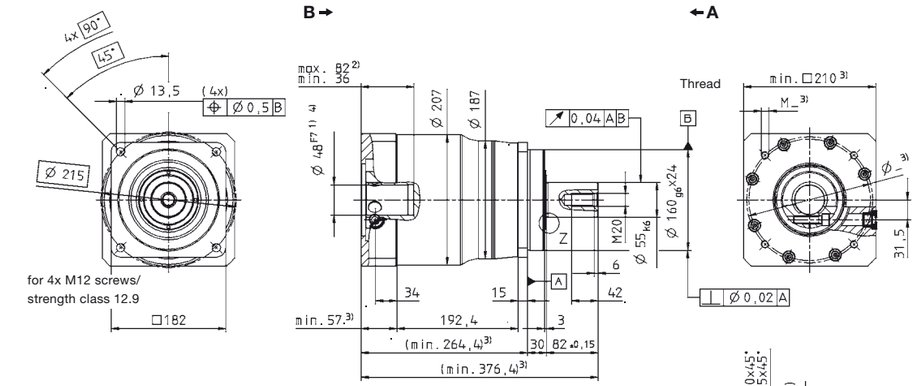
up to 24 [4] (G) clamping hub diameter



up to 32/38 [4] (I/K) clamping hub diameter

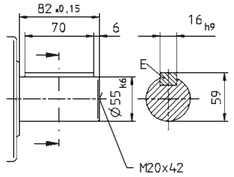


up to 48 [4] (M) clamping hub diameter

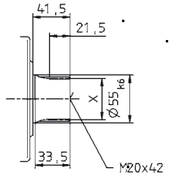


Alternatives: Output shaft variants

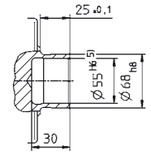
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



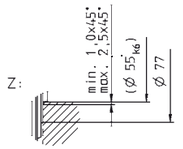
Involute gearing DIN 5480 in mm
X = W 55 x 2 x 30 x 26 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Z: Detail



Connecting part

Non-tolerated dimensions ± 1 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 210 MF 1/2-stage

			1-stage					2-stage								
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	- Please contact us -													
		in.lb														
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1600	2500	2500	2400	1900	2400	2500	2500	2400	2400	2400	2400	2400	1900
		in.lb	14160	22125	22125	21240	16815	21240	22125	22125	21240	21240	21240	21240	21240	16815
Nominal output torque (with n_{2N})	T_{2N}	Nm	1100	1500	1500	1400	1000	1500	1500	1500	1500	1500	1500	1500	1400	1000
		in.lb	9735	13275	13275	12390	8850	13275	13275	13275	13275	13275	13275	13275	12390	8850
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	5000	5200	5200	5200	5000	5200	5200	5200	5200	5200	5200	5200	5200	5000
		in.lb	44250	46020	46020	46020	44250	46020	46020	46020	46020	46020	46020	46020	46020	44250
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	1200	1200	1500	1700	2000	2500	2500	2500	2500	2500	2500	2500	3000	3000
Max. input speed	n_{1Max}	rpm	2500	2500	2500	2500	2500	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}	Nm	32	22	17	11	7,0	7,0	6,0	5,5	4,5	4,0	3,5	3,5	3,5	3,0
		in.lb	283	195	151	97	62	62	53	49	40	35	31	31	31	27
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1					Standard ≤ 5 / Reduced ≤ 3								
Torsional rigidity	C_{t21}	Nm/ arcmin	400					400								
		in.lb/ arcmin	3540					3540								
Max. axial force [c]	F_{2AMax}	N	30000					30000								
		lb_f	6750					6750								
Max. radial force [c]	F_{2RMax}	N	21000					21000								
		lb_f	4725					4725								
Max. tilting moment	M_{2KMax}	Nm	3100					3100								
		in.lb	27435					2744								
Efficiency at full load	η	%	97					94								
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000					> 20000								
Weight incl. standard adapter plate	m	kg	56					53								
		lb_m	124					117								
Operating noise (with i=10 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 64													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead same direction													
Protection class			IP 65													
Moment of inertia (relates to the drive)	M 48	J_1 kgcm²	-	-	-	-	-	34.5	31.5	30.8	30.0	29.7	28.5	28.3	28.1	28.0
		10^{-3} in.lb.s²	-	-	-	-	-	30.5	27.9	27.3	26.6	26.3	25.2	25.0	24.9	24.8
Clamping hub diameter (mm)	N 55	J_1 kgcm²	139.0	94.3	76.9	61.5	53.1	-	-	-	-	-	-	-	-	-
		10^{-3} in.lb.s²	118.2	80.2	65.4	52.3	45.1									

Reduced mass moments of inertia available on request.

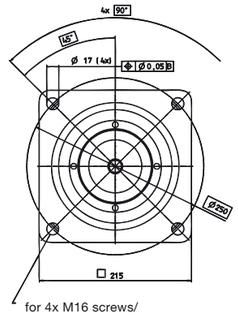
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

View A

1-stage:

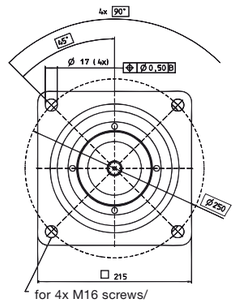
up to 55 [4] (N) clamping hub diameter



for 4x M16 screws/
strength class 12.9

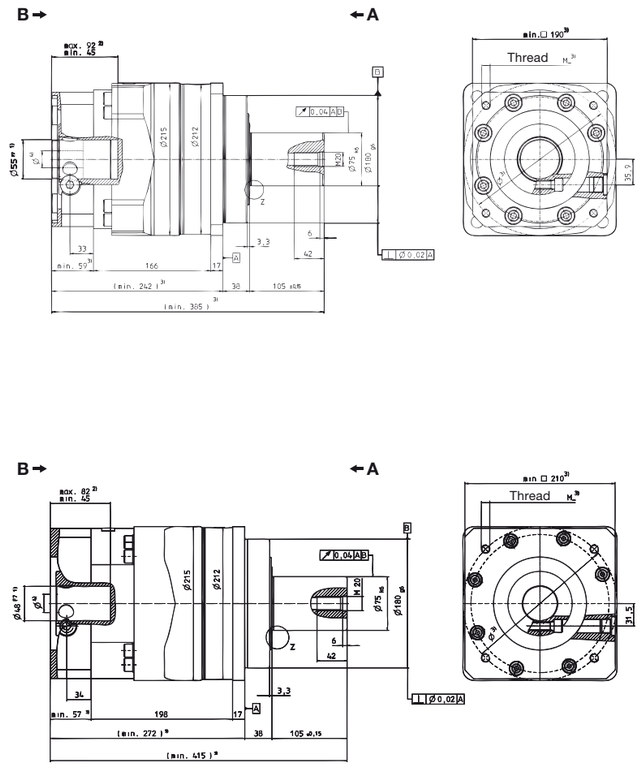
2-stage:

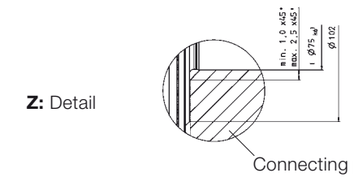
up to 48 [4] (M) clamping hub diameter



for 4x M16 screws/
strength class 12.9

View B



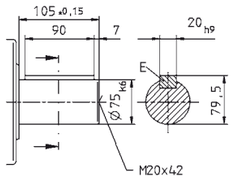


Z: Detail

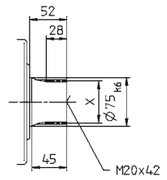
Connecting part

Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 70 x 2 x 30 x 34 x 6m, DIN 5480



Non-tolerated dimensions ± 1.5 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SP+ 240 MF 1/2-stage

			1-stage					2-stage								
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
cymex®-optimized acceleration torque (please contact us regarding the design)	T_{2Bcym}	Nm	- Please contact us -													
		in.lb														
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	2750	4500	4500	4300	3400	4500	4500	4500	4500	4500	4000	4300	4300	3400
		in.lb	24338	39825	39825	38055	30090	39825	39825	39825	39825	39825	35400	38055	38055	30090
Nominal output torque (with n_{2N})	T_{2N}	Nm	1500	2500	2500	2300	1700	2500	2500	2500	2500	2500	2500	2500	2300	1700
		in.lb	13275	22125	22125	20355	15045	22125	22125	22125	22125	22125	22125	22125	20355	15045
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	6800	8500	8500	8500	6800	8500	8500	8500	8500	8500	8500	8500	8500	6800
		in.lb	60180	75225	75225	75225	60180	75225	75225	75225	75225	75225	75225	75225	75225	60180
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	1000	1000	1200	1500	1700	2300	2500	2500	2500	2500	2500	2500	2800	2800
Max. input speed	n_{1Max}	rpm	2200	2200	2200	2200	2200	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}	Nm	45	35	26	16	11	11	9,0	8,0	7,0	6,0	5,0	4,5	4,0	4,0
		in.lb	398	310	230	142	97	97	80	71	62	53	44	40	35	35
Max. torsional backlash	j_t	arcmin	Standard ≤ 3 / Reduced ≤ 1					Standard ≤ 5 / Reduced ≤ 3								
Torsional rigidity	C_{t21}	Nm/ arcmin	550					550								
		in.lb/ arcmin	4868					4868								
Max. axial force [c]	F_{2AMax}	N	33000					33000								
		lb_f	7425					7425								
Max. radial force [c]	F_{2RMax}	N	30000					30000								
		lb_f	6750					6750								
Max. tilting moment	M_{2KMax}	Nm	5000					5000								
		in.lb	44250					44250								
Efficiency at full load	η	%	97					94								
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000					> 20000								
Weight incl. standard adapter plate	m	kg	77					76								
		lb_m	170					168								
Operating noise (with i=10 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead same direction													
Protection class			IP 65													
Moment of inertia (relates to the drive)	M 48 J_1	kgcm²	-	-	-	-	-	39.2	34.6	33.2	30.5	29.7	28.2	27.9	27.6	27.5
		10^{-3} in.lb.s²	-	-	-	-	-	34.7	30.6	29.4	27.0	26.3	25.0	24.7	24.4	24.3
Clamping hub diameter [mm]	O 60 J_1	kgcm²	260.2	198.2	163.0	84.4	70.8	-	-	-	-	-	-	-	-	-
		10^{-3} in.lb.s²	230.3	175.4	144.3	74.7	62.7									

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

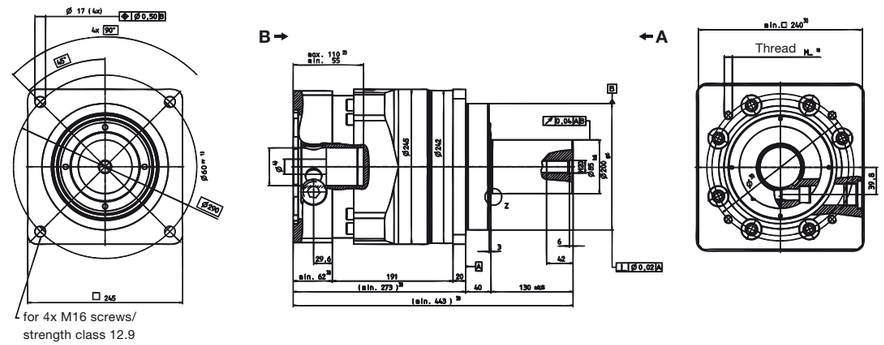
View A

View B

Motor shaft diameter [mm]

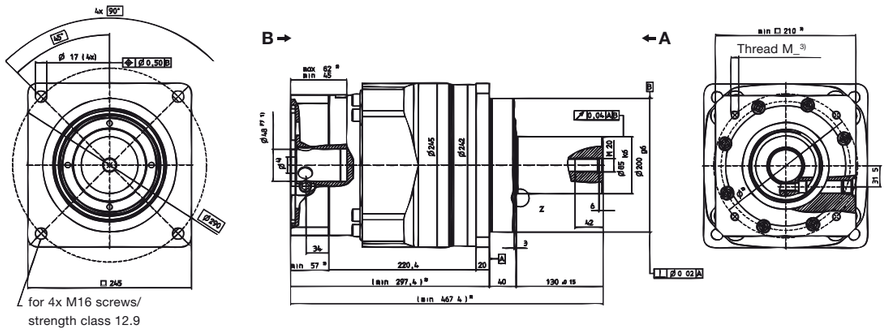
up to 60 [4] (O) clamping hub diameter

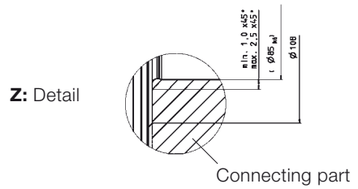
1-stage:



up to 48 [4] (M) clamping hub diameter

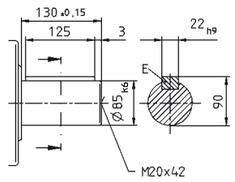
2-stage:



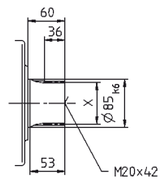


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 80 x 2 x 30 x 38 x 6m, DIN 5480



Non-tolerated dimensions ± 1.5 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length.
Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SP+ 075 MC 1-stage

				1-stage				
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	68	90	90	90	70
			in.lb	602	797	797	797	620
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}		Nm	–	60	60	60	35
			in.lb	–	531	531	531	310
Nominal output torque (with n_{2N})	T_{2N}		Nm	28	48	48	48	30
			in.lb	248	425	425	425	266
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	200	250	250	250	200
			in.lb	1770	2213	2213	2213	1770
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}		rpm	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}		rpm	6000	6000	6000	6000	6000
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [c]	T_{012}		Nm	1.4	1.1	0.9	0.6	0.5
			in.lb	12.4	9.7	8.0	5.3	4.4
Max. torsional backlash	j_t		arcmin	Standard ≤ 6 / Reduced ≤ 4				
Torsional rigidity	C_{t21}		Nm/ arcmin	10				
			in.lb/ arcmin	89				
Max. axial force [d]	F_{2AMax}		N	3350				
			lb_f	754				
Max. radial force [d]	F_{2RMax}		N	4200				
			lb_f	945				
Max. tilting moment	M_{2KMax}		Nm	236				
			in.lb	2089				
Efficiency at full load	η		%	98.5				
Service life (For calculation, see the Chapter “Information”)	L_h		h	> 30000				
Weight incl. standardadapter plate	m		kg	3.9				
			lb_m	8.6				
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}		dB(A)	≤ 59				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	0 to +40				
			F	32 to 104				
Lubrication				Lubricated for life				
Paint				Blue RAL 5002				
Direction of rotation				Motor and gearhead same direction				
Protection class				IP 65				
Moment of inertia (relates to the drive)	E	19	J_1	kgcm²	1.03	0.78	0.68	0.59	0.54
				10^{-3} in.lb.s²	0.91	0.69	0.60	0.52	0.48
Clamping hub diameter [mm]	G	24	J_1	kgcm²	2.40	2.15	2.05	1.96	1.91
				10^{-3} in.lb.s²	2.12	1.90	1.81	1.73	1.69

Reduced mass moments of inertia available on request.

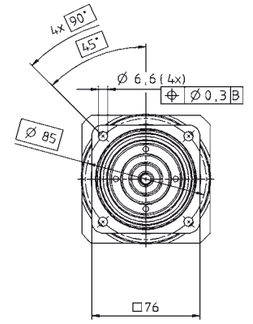
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to centre of the output shaft or flange

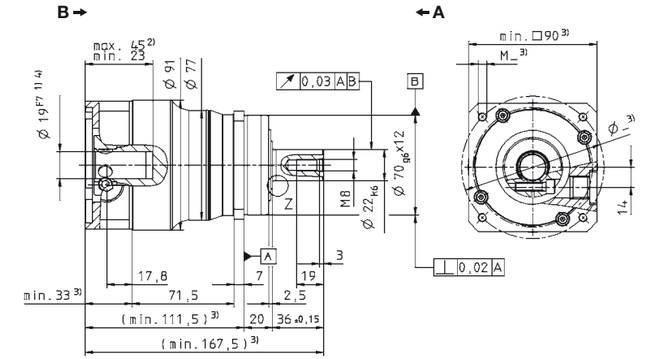
Motor shaft diameter [mm]

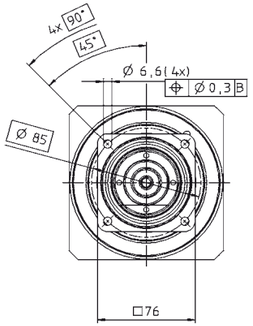
up to 19 [4] (E) clamping hub diameter

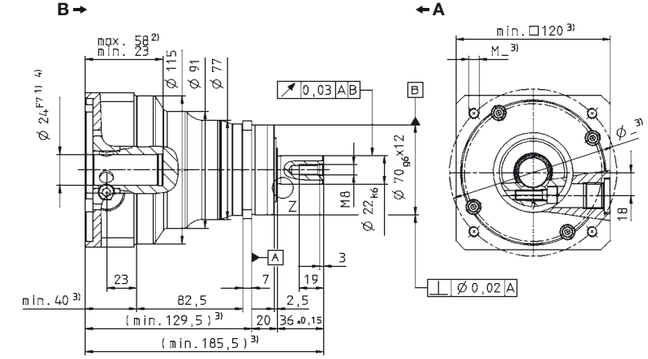
up to 24 [4] (G) clamping hub diameter

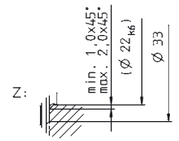
View A





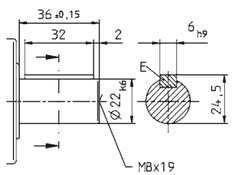




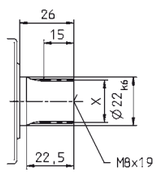


Alternatives: Output shaft variants

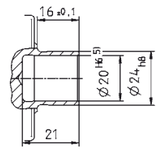
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 16 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 075 MC 2-stage

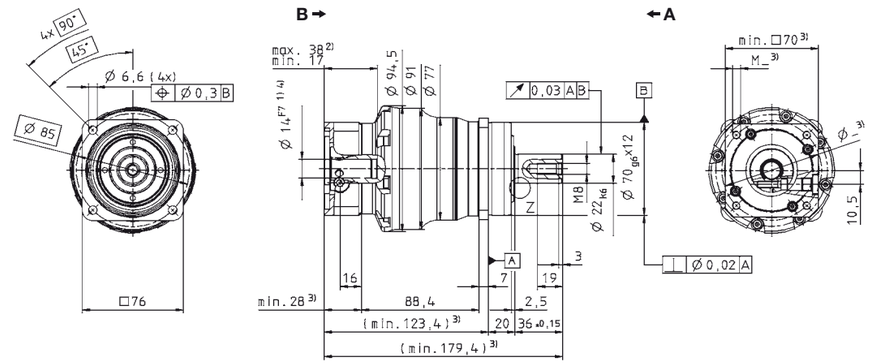
				2-stage								
Ratio [a]	i			**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		90	90	90	90	90	90	90	90	70
		in.lb		797	797	797	797	797	797	797	797	620
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}	Nm		–	–	–	–	–	60	–	–	35
		in.lb							531			310
Nominal output torque (with n_{2N})	T_{2N}	Nm		60	60	60	60	60	55	60	60	30
		in.lb		531	531	531	531	531	487	531	531	266
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		250	250	250	250	250	250	250	250	200
		in.lb		2213	2213	2213	2213	2213	2213	2213	2213	1770
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2
		in.lb		4.4	3.5	3.5	2.7	2.7	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin		Standard ≤ 8 / Reduced ≤ 6								
Torsional rigidity	C_{t21}	Nm/ arcmin		10								
		in.lb/ arcmin		89								
Max. axial force [d]	F_{2AMax}	N		3350								
		lb_f		754								
Max. radial force [d]	F_{2RMax}	N		4200								
		lb_f		945								
Max. tilting moment	M_{2KMax}	Nm		236								
		in.lb		2089								
Efficiency at full load	η	%		96,5								
Service life (For calculation, see the Chapter “Information”)	L_h	h		> 30000								
Weight incl. standard adapter plate	m	kg		3,6								
		lb_m		8.0								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 59								
Max. permitted housing temperature		°C		+90								
		F		194								
Ambient temperature		°C		0 to +40								
		F		32 to 104								
Lubrication				Lubricated for life								
Paint				Blue RAL 5002								
Direction of rotation				Motor and gearhead same direction								
Protection class				IP 65								
Moment of inertia (relates to the drive)	C	14	J_1	kgcm²	0.23	0.20	0.20	0.18	0.18	0.16	0.16	0.16	0.16
				10⁻³ in.lb.s²	0.20	0.18	0.18	0.16	0.16	0.15	0.15	0.14	0.14
Clamping hub diameter [mm]	E	19	J_1	kgcm²	0.55	0.53	0.52	0.50	0.50	0.49	0.49	0.49	0.49
				10⁻³ in.lb.s²	0.49	0.47	0.46	0.45	0.44	0.43	0.43	0.43	0.43

Reduced mass moments of inertia available on request.

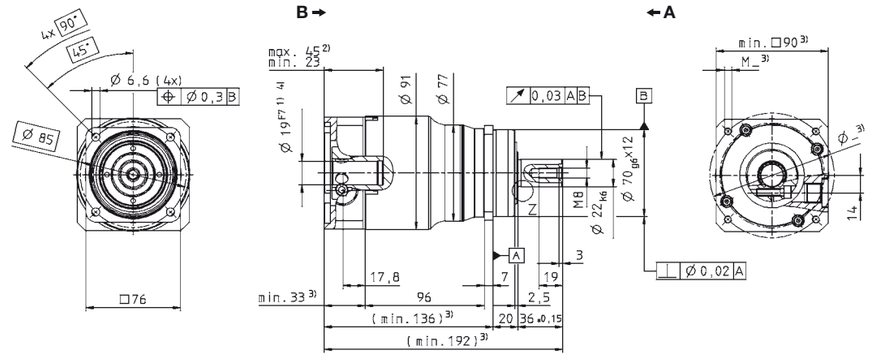
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 14 mm
[d] Refers to centre of the output shaft or flange

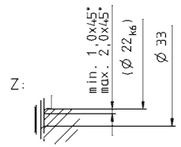
Motor shaft diameter [mm]

up to 14 [4] (C) clamping hub diameter



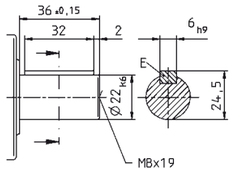
up to 19 [4] (E) clamping hub diameter



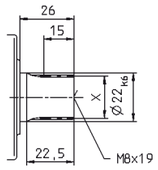


Alternatives: Output shaft variants

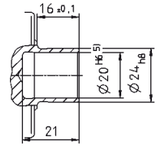
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 16 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 100 MC 1-stage

				1-stage				
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	180	240	240	240	180
			in.lb	1593	2124	2124	2124	1593
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}		Nm	95	135	135	135	90
			in.lb	841	1195	1195	1195	797
Nominal output torque (with n_{1N})	T_{2N}		Nm	70	100	105	105	80
			in.lb	620	885	929	929	708
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	500	625	625	625	500
			in.lb	4425	5531	5531	5531	4425
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}		rpm	3500	4000	4500	4500	4500
Max. input speed	n_{1Max}		rpm	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}		Nm	2.4	2.1	1.8	1.1	0.8
			in.lb	21.2	18.6	15.9	9.74	7.08
Max. torsional backlash	j_t		arcmin	Standard ≤ 4 / Reduced ≤ 2				
Torsional rigidity	C_{t21}		Nm/ arcmin	31				
			in.lb/ arcmin	274				
Max. axial force [d]	F_{2AMax}		N	5650				
			lb_f	1271				
Max. radial force [d]	F_{2RMax}		N	6600				
			lb_f	1485				
Max. tilting moment	M_{2KMax}		Nm	487				
			in.lb	4310				
Efficiency at full load	η		%	98.5				
Service life (For calculation, see the Chapter “Information”)	L_h		h	> 30000				
Weight incl. standard adapter plate	m		kg	7.7				
			lb_m	17.0				
Operating noise (with i=10 and n_1 = 3000 rpm no load)	L_{PA}		dB(A)	≤ 64				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	0 to +40				
			F	32 to 104				
Lubrication				Lubricated for life				
Paint				Blue RAL 5002				
Direction of rotation				Motor and gearhead same direction				
Protection class				IP 65				
Moment of inertia (relates to the drive)	G	24	J_1	kgcm²	3.99	3.04	2.61	2.29	2.07
				10^{-3} in.lb.s²	3.53	2.69	2.31	2.03	1.83
Clamping hub diameter [mm]	K	38	J_1	kgcm²	11.1	10.1	9.68	9.36	9.14
				10^{-3} in.lb.s²	9.78	8.95	8.57	8.28	8.09

Reduced mass moments of inertia available on request.

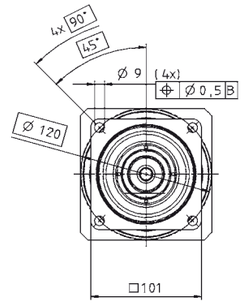
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 24 mm
[d] Refers to centre of the output shaft or flange

Motor shaft diameter [mm]

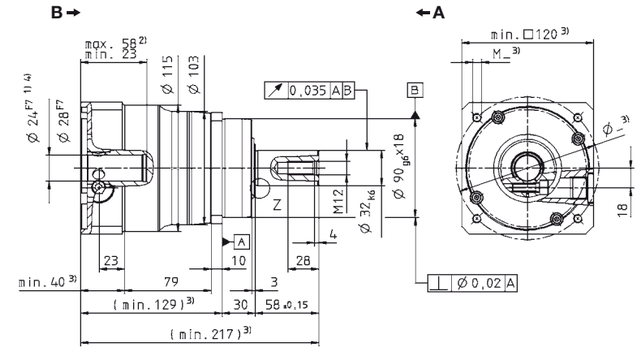
up to 24 [4] (G) clamping hub diameter

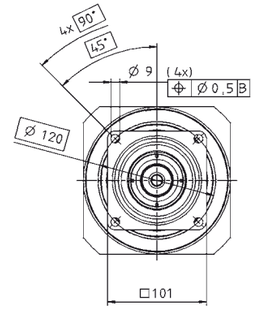
up to 38 [4] (K) clamping hub diameter

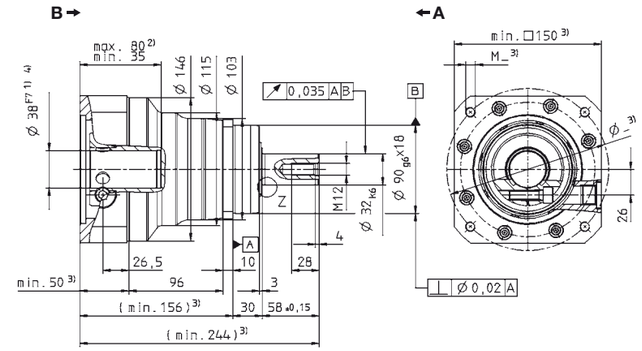
View A

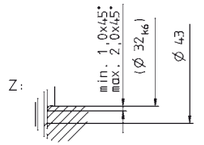


View B



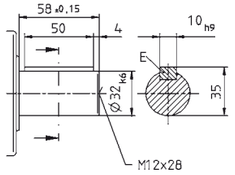




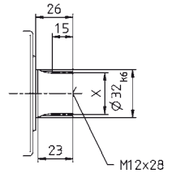


Alternatives: Output shaft variants

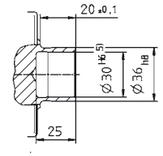
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 32 x 1.25 x 30 x 24 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 100 MC 2-stage

				2-stage								
Ratio [a]	i			**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		240	240	240	240	240	240	240	240	180
		in.lb		2124	2124	2124	2124	2124	2124	2124	2124	1593
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}	Nm		–	–	–	–	–	–	–	–	90
		in.lb										797
Nominal output torque (with n_{2N})	T_{2N}	Nm		140	140	140	140	140	140	140	135	80
		in.lb		1239	1239	1239	1239	1239	1239	1239	1195	708
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		625	625	625	625	625	625	625	625	500
		in.lb		5531	5531	5531	5531	5531	5531	5531	5531	4425
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3
		in.lb		7.1	6.2	5.3	4.4	3.5	3.5	2.7	2.7	2.7
Max. torsional backlash	j_t	arcmin		Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/ arcmin		31								
		in.lb/ arcmin		274								
Max. axial force [d]	F_{2AMax}	N		5650								
		lb_f		1271								
Max. radial force [d]	F_{2RMax}	N		6600								
		lb_f		1485								
Max. tilting moment	M_{2KMax}	Nm		487								
		in.lb		4310								
Efficiency at full load	η	%		96.5								
Service life (For calculation, see the Chapter “Information”)	L_h	h		> 30000								
Weight incl. standardadapter plate	m	kg		7.9								
		lb_m		17.5								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 60								
Max. permitted housing temperature		°C		+90								
		F		194								
Ambient temperature		°C		0 to +40								
		F		32 to 104								
Lubrication				Lubricated for life								
Paint				Blue RAL 5002								
Direction of rotation				Motor and gearhead same direction								
Protection class				IP 65								
Moment of inertia (relates to the drive)	E	19	J_1	kgcm²	0.81	0.70	0.69	0.60	0.59	0.55	0.54	0.54	0.54
				10^{-3} in.lb.s²	0.72	0.62	0.61	0.53	0.52	0.48	0.48	0.48	0.47
Clamping hub diameter [mm]	G	24	J_1	kgcm²	2.18	2.07	2.05	1.97	1.96	1.92	1.91	1.91	1.91
				10^{-3} in.lb.s²	1.93	1.83	1.82	1.74	1.74	1.70	1.69	1.69	1.69

Reduced mass moments of inertia available on request.

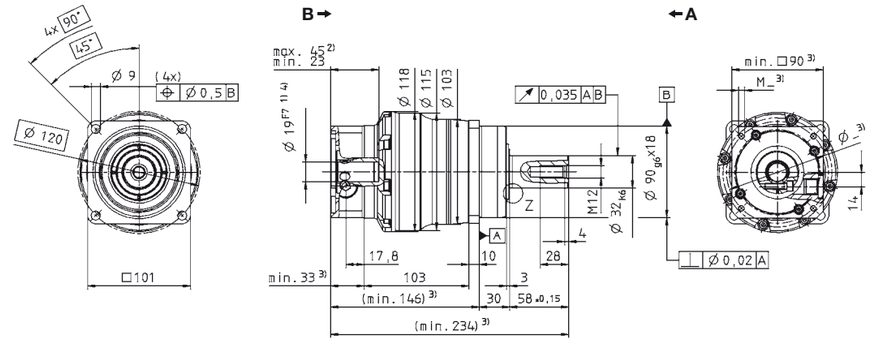
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to centre of the output shaft or flange

View A

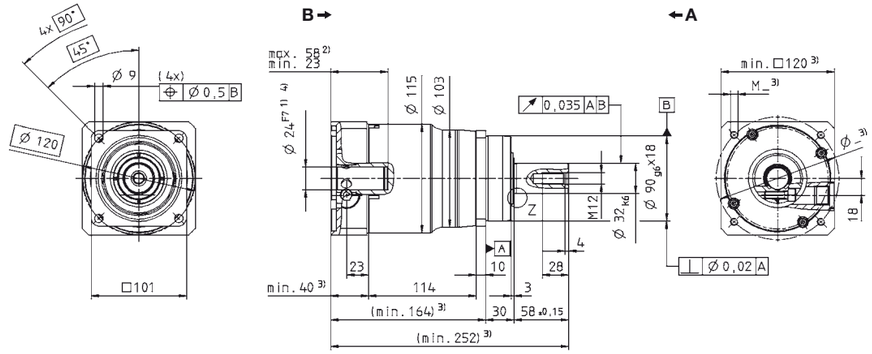
View B

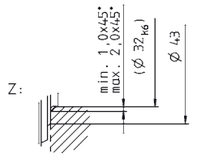
Motor shaft diameter [mm]

up to 19 [4] (E) clamping hub diameter



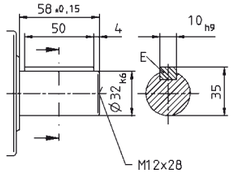
up to 24 [4] (G) clamping hub diameter



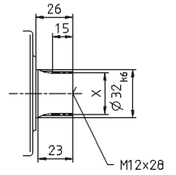


Alternatives: Output shaft variants

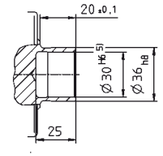
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 32 x 1.25 x 30 x 24 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 140 MC 1-stage

			1-stage				
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	310	480	480	480	380
		in.lb	2744	4248	4248	4248	3363
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}	Nm	150	240	240	270	180
		in.lb	1328	2124	2124	2390	1593
Nominal output torque (with n_{2N})	T_{2N}	Nm	130	195	205	210	160
		in.lb	1151	1726	1814	1859	1416
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1000	1250	1250	1250	1000
		in.lb	8850	11063	11063	11063	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	3000	3500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	5.1	3.9	3.1	2.3	1.6
		in.lb	45.1	34.5	27.4	20.4	14.2
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2				
Torsional rigidity	C_{t21}	Nm/ arcmin	53				
		in.lb/ arcmin	469				
Max. axial force [d]	F_{2AMax}	N	9870				
		lb_f	2221				
Max. radial force [d]	F_{2RMax}	N	9900				
		lb_f	2228				
Max. tilting moment	M_{2KMax}	Nm	952				
		in.lb	8425				
Efficiency at full load	η	%	98.5				
Service life (For calculation, see the Chapter "Information")	L_h	h	> 30000				
Weight incl. standard adapter plate	m	kg	17.2				
		lb_m	38				
Operating noise (with i=10 and n_1=3000 rpm no load)	L_{PA}	dB(A)	≤ 65				
Max. permitted housing temperature		°C	+90				
		F	194				
Ambient temperature		°C	0 to +40				
		F	32 to 104				
Lubrication			Lubricated for life				
Paint			Blue RAL 5002				
Direction of rotation			Motor and gearhead same direction				
Protection class			IP 65				
Moment of inertia (relates to the drive) K 38	J_1	$kgcm^2$	14.9	12.1	11.0	10.1	9.51
		10^{-3} in.lb.s²	13.2	10.7	9.8	8.9	8.4
Clamping hub diameter [mm] M 48	J_1	$kgcm^2$	29.5	26.7	25.6	24.7	24.2
		10^{-3} in.lb.s²	26.1	23.6	22.7	21.9	21.4

Reduced mass moments of inertia available on request.

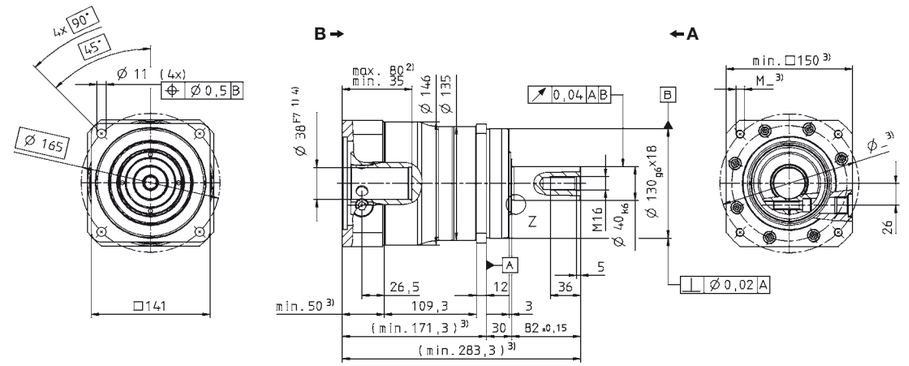
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 19 mm
[d] Refers to center of the output shaft or flange

Motor shaft diameter [mm]

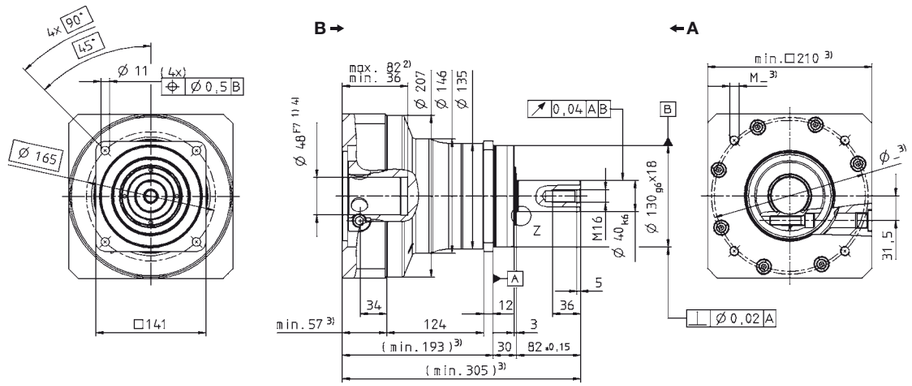
View A

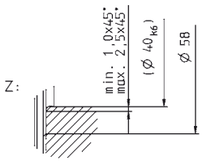
View B

up to 38 [4] (K) clamping hub diameter



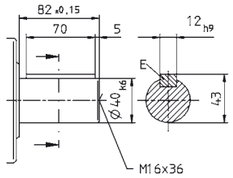
up to 48 [4] (M) clamping hub diameter



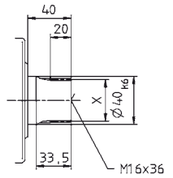


Alternatives: Output shaft variants

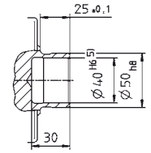
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 40 x 2 x 30 x 18 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 140 MC 2-stage

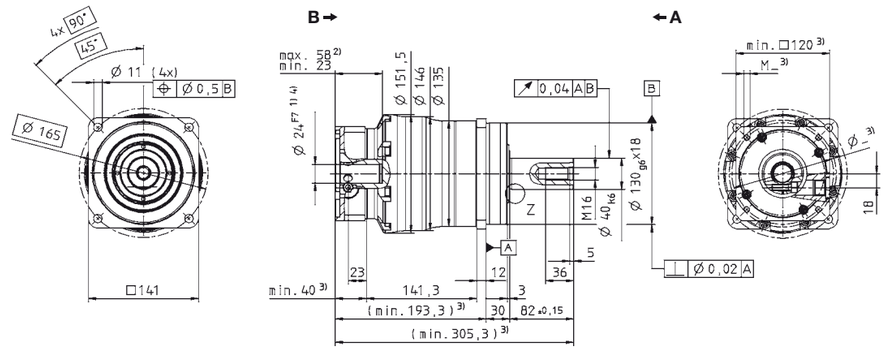
				2-stage								
Ratio [a]	i			**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		480	480	480	480	480	480	480	480	380
		in.lb		4248	4248	4248	4248	4248	4248	4248	4248	3363
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2NCym}	Nm		290	290	290	–	–	–	–	–	–
		in.lb		2567	2567	2567						
Nominal output torque (with n_{2N})	T_{2N}	Nm		260	280	280	290	290	290	290	260	180
		in.lb		2301	2478	2478	2567	2567	2567	2567	2301	1593
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		1250	1250	1250	1250	1250	1250	1250	1250	1000
		in.lb		11063	11063	11063	11063	11063	11063	11063	11063	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm		1.6	1.3	1.2	1.0	0.9	0.7	0.6	0.5	0.5
		in.lb		14.2	11.5	10.6	8.9	8.0	6.2	5.3	4.4	4.4
Max. torsional backlash	j_t	arcmin		Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/ arcmin		53								
		in.lb/ arcmin		469								
Max. axial force [d]	F_{2AMax}	N		9870								
		lb_f		2221								
Max. radial force [d]	F_{2RMax}	N		9900								
		lb_f		2228								
Max. tilting moment	M_{2KMax}	Nm		952								
		in.lb		8425								
Efficiency at full load	η	%		96.5								
Service life (For calculation, see the Chapter “Information”)	L_h	h		> 30000								
Weight incl. standard adapter plate	m	kg		17								
		lb_m		38								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 63								
Max. permitted housing temperature		°C		+90								
		F		194								
Ambient temperature		°C		0 to +40								
		F		32 to 104								
Lubrication				Lubricated for life								
Paint				Blue RAL 5002								
Direction of rotation				Motor and gearhead same direction								
Protection class				IP 65								
Moment of inertia (relates to the drive)	G	24	J_1	kgcm²	3.19	2.71	2.67	2.34	2.32	2.10	2.08	2.08	2.07
				10⁻³ in.lb.s²	2.82	2.40	2.36	2.07	2.05	1.85	1.85	1.84	1.83
Clamping hub diameter [mm]	K	38	J_1	kgcm²	10.3	9.77	9.73	9.41	9.39	9.16	9.15	9.14	9.14
				10⁻³ in.lb.s²	9.07	8.65	8.61	8.33	8.31	8.11	8.10	8.09	8.09

Reduced mass moments of inertia available on request.

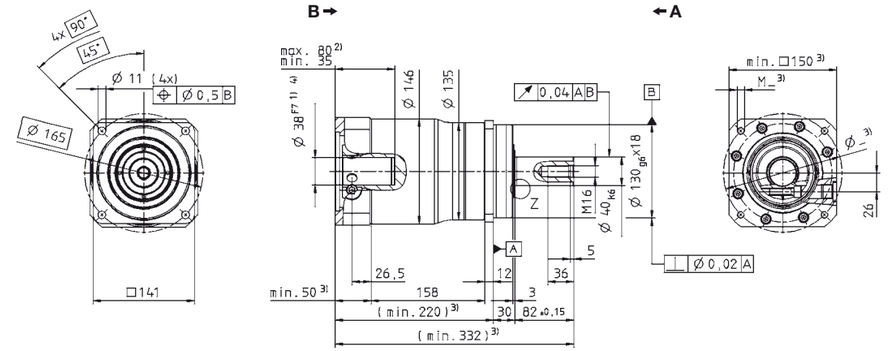
[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 24 mm
[d] Refers to center of the output shaft or flange

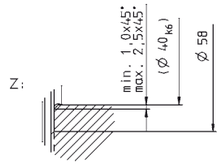
Motor shaft diameter [mm]

up to 24 [4] (G) clamping hub diameter



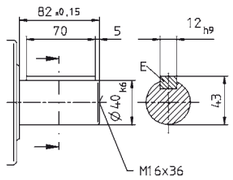
up to 38 [4] (K) clamping hub diameter



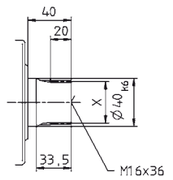


Alternatives: Output shaft variants

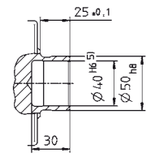
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 40 x 2 x 30 x 18 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 180 MC 1-stage

			1-stage				
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	700	880	880	880	700
		in.lb	6195	7788	7788	7788	6195
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}	Nm	350	600	600	600	540
		in.lb	3098	5310	5310	5310	4779
Nominal output torque (with n_{2N})	T_{2N}	Nm	290	450	440	450	400
		in.lb	2567	3983	3894	3983	3540
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	2200	2750	2750	2750	2200
		in.lb	19470	24338	24338	24338	19470
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	3000	3500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	4500	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	10.2	7.7	6.2	4.5	3.2
		in.lb	90.3	68.1	54.9	39.8	28.3
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2				
Torsional rigidity	C_{t21}	Nm/ arcmin	175				
		in.lb/ arcmin	1549				
Max. axial force [d]	F_{2AMax}	N	14150				
		lb_f	3184				
Max. radial force [d]	F_{2RMax}	N	15400				
		lb_f	3465				
Max. tilting moment	M_{2KMax}	Nm	1600				
		in.lb	14160				
Efficiency at full load	η	%	98.5				
Service life (For calculation, see the Chapter "Information")	L_h	h	> 30000				
Weight incl. standard adapter plate	m	kg	34				
		lb_m	75				
Operating noise (with i=10 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66				
Max. permitted housing temperature		°C	+90				
		F	194				
Ambient temperature		°C	0 to +40				
		F	32 to 104				
Lubrication			Lubricated for life				
Paint			Blue RAL 5002				
Direction of rotation			Motor and gearhead same direction				
Protection class			IP 65				
Moment of inertia (relates to the drive)	M	48	J_1 kgcm²	58.5	41.6	35.6	30.0	26.9
Clamping hub diameter [mm]			10^{-3} in.lb.s²	51.8	36.8	31.5	26.6	23.8

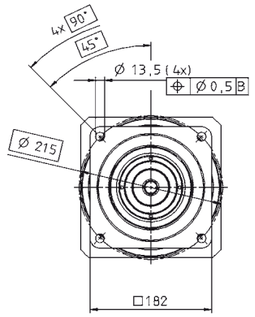
Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 48 mm
[d] Refers to center of the output shaft or flange

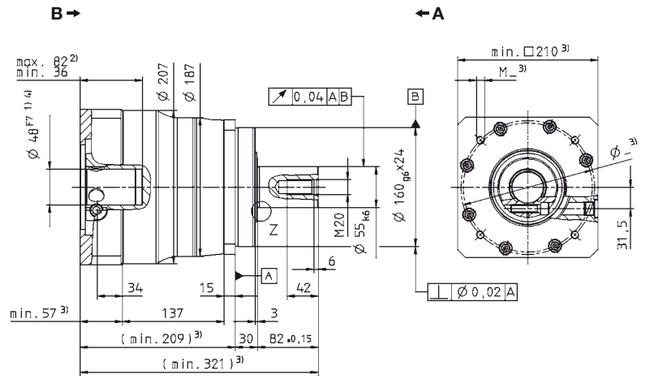
Motor shaft diameter [mm]

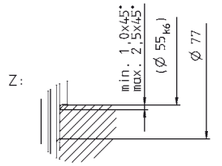
up to 48 [4] (M) clamping hub diameter

View A



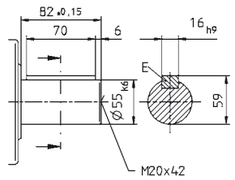
View B



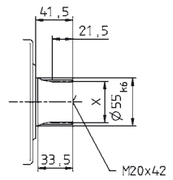


Alternatives: Output shaft variants

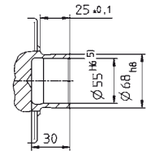
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 55 x 2 x 30 x 26 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 180 MC 2-stage

			2-stage								
Ratio [a]	i		**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	880	880	880	880	880	880	880	880	700
		in.lb	7788	7788	7788	7788	7788	7788	7788	7788	6195
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2NCym}	Nm	–	–	–	–	–	–	–	–	–
		in.lb									
Nominal output torque (with n_{2N})	T_{2N}	Nm	600	600	600	600	600	600	600	600	600
		in.lb	5310	5310	5310	5310	5310	5310	5310	5310	5310
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	2750	2750	2750	2750	2750	2750	2750	2750	2200
		in.lb	24338	24338	24338	24338	24338	24338	24338	24338	19470
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [c]	T_{012}	Nm	3.2	2.6	2.3	1.9	1.7	1.4	1.2	1.0	0.9
		in.lb	28.3	23.0	20.4	16.8	15.0	12.4	10.6	8.9	8.0
Max. torsional backlash	j_t	arcmin	Standard ≤ 6 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/ arcmin	175								
		in.lb/ arcmin	149								
Max. axial force [d]	F_{2AMax}	N	14150								
		lb_f	3184								
Max. radial force [d]	F_{2RMax}	N	15400								
		lb_f	3465								
Max. tilting moment	M_{2KMax}	Nm	1600								
		in.lb	14160								
Efficiency at full load	η	%	96.5								
Service life (For calculation, see the Chapter "Information")	L_h	h	> 30000								
Weight incl. standard adapter plate	m	kg	36								
		lb_m	80								
Operating noise (with i=100 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66								
Max. permitted housing temperature		°C	+90								
		F	194								
Ambient temperature		°C	0 to +40								
		F	32 to 104								
Lubrication			Lubricated for life								
Paint			Blue RAL 5002								
Direction of rotation			Motor and gearhead same direction								
Protection class			IP 65								
Moment of inertia (relates to the drive)	K	38	J_1	$kgcm^2$	13.5	12.0	11.7	10.6	10.4	9.74	9.68	9.63	9.60
Clamping hub diameter [mm]				10^{-3} in.lb.s^2	12.0	10.6	10.4	9.34	9.23	8.62	8.57	8.52	8.49

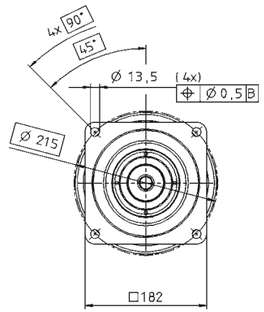
Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Valid for clamping hub diameter of 38 mm
[d] Refers to center of the output shaft or flange

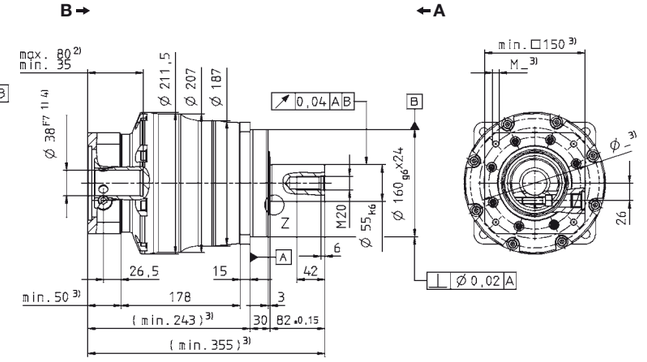
Motor shaft diameter [mm]

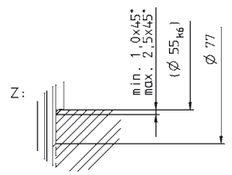
up to 38 [4] (K) clamping hub diameter

View A



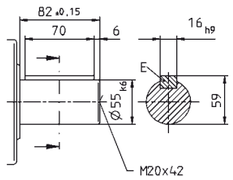
View B



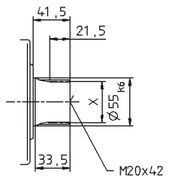


Alternatives: Output shaft variants

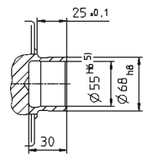
Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 55 x 2 x 30 x 26 x 6m, DIN 5480



Shaft mounted
Mounted via HSD shrink disc



Non-tolerated dimensions ± 1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

SP+ 210 MC 1/2-stage

				1-stage					2-stage								
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	1200	2000	2000	1700	1200	1680	1800	2000	1680	1920	1040	1300	1700	1200
			in.lb	10620	17700	17700	15045	10620	14868	15930	17700	14868	16992	9204	11505	15045	10620
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}		Nm	- Please contact us -													
			in.lb														
Nominal output torque (with n_{2N})	T_{2N}		Nm	900	1300	1150	1000	800	840	780	975	780	975	800	1000	1000	800
			in.lb	7965	11505	10178	8850	7080	7434	6903	8629	6903	8629	7080	8850	8850	7080
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	5000	5200	5200	5200	5000	5200	5200	5200	5200	5200	5200	5200	5200	5000
			in.lb	44250	46020	46020	46020	44250	46020	46020	46020	46020	46020	46020	46020	46020	44250
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}		rpm	2250	2500	3500	3500	3500	3500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}		rpm	3400	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}		Nm	13.0	9.0	6.5	4.0	2.5	3.0	2,5	2,5	2,0	2,0	1,5	1,5	1,5	1,5
			in.lb	115.1	79.7	57.5	35.4	22.1	27	22	22	18	18	13	13	13	13
Max. torsional backlash	j_t		arcmin	Standard ≤ 4 / Reduced ≤ 2					Standard ≤ 5 / Reduced ≤ 4								
Torsional rigidity	C_{t21}		Nm/ arcmin	400					400								
			in.lb/ arcmin	3540					3540								
Max. axial force [c]	F_{2AMax}		N	30000					30000								
			lb_f	6750					6750								
Max. radial force [c]	F_{2RMax}		N	21000					21000								
			lb_f	4725					4725								
Max. tilting moment	M_{2KMax}		Nm	3100					3100								
			in.lb	27435					27435								
Efficiency at full load	η		%	98.5					96.5								
Service life (For calculation, see the Chapter "Information")	L_h		h	> 30000					> 30000								
Weight incl. standard adapter plate	m		kg	56					53								
			lb_m	124					117								
Operating noise (with i=10 and n_1 = 2000 rpm no load)	L_{PA}		dB(A)	≤ 64													
Max. permitted housing temperature			°C	+90													
			F	194													
Ambient temperature			°C	0 to +40													
			F	32 to 194													
Lubrication				Lubricated for life													
Paint				Blue RAL 5002													
Direction of rotation				Motor and gearhead same direction													
Protection class				IP 65													
Moment of inertia (relates to the drive)	M	48	J_1	kgcm²	-	-	-	-	-	34.5	31.5	30.8	30.0	29.7	28.5	28.3	28.1	28.0
				10^{-3} in.lb.s²						30.5	27.9	27.3	26.6	26.3	25.2	25.0	24.9	24.8
Clamping hub diameter (mm)	N	55	J_1	kgcm²	139.0	94.3	76.9	61.5	53.1	-	-	-	-	-	-	-	-	-
				10^{-3} in.lb.s²	123.0	83.5	68.1	54.4	47.0									

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

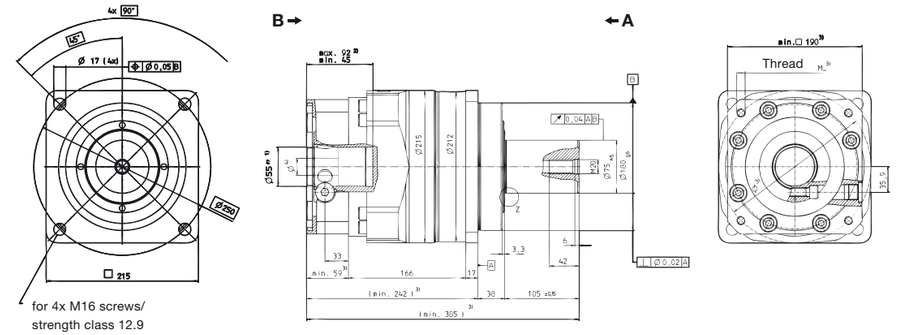
View A

View B

Motor shaft diameter [mm]

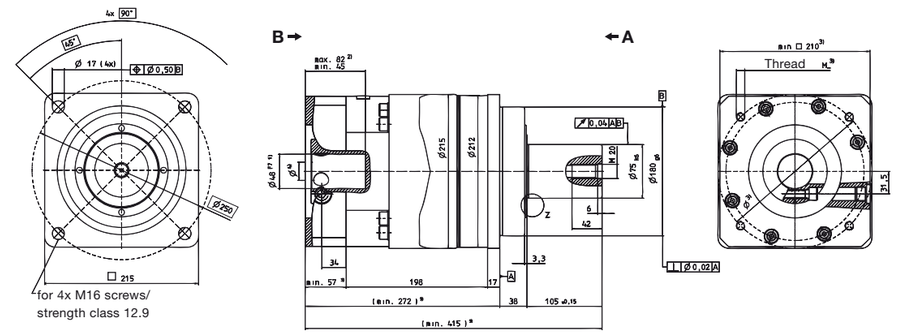
up to 55 [4] (N) clamping hub diameter

1-stage:



for 4x M16 screws/
strength class 12.9

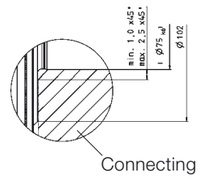
2-stage:



up to 48 [4] (M) clamping hub diameter

for 4x M16 screws/
strength class 12.9

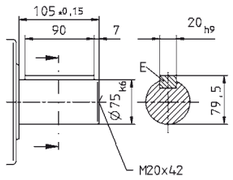
Z: Detail



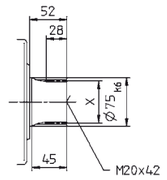
Connecting part

Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 70 x 2 x 30 x 34 x 6m, DIN 5480



Non-tolerated dimensions ± 1.5 mm

1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SP+ 240 MC 1/2-stage

				1-stage					2-stage								
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		1750	3500	3600	2700	1800	3500	3500	3600	2900	3600	1680	2100	2700	1800
		in.lb		15488	30975	31860	23895	15930	30975	30975	31860	25665	31860	14868	18585	23895	15930
cymex®-optimal nominal torque (please contact us regarding the design)	T_{2Ncym}	Nm		- Please contact us -													
		in.lb															
Nominal output torque (with n_{2N})	T_{2N}	Nm		1400	1960	1770	1500	1100	1790	1770	1730	1840	1930	1300	1625	1500	1100
		in.lb		12390	17346	15665	13275	9735	15842	15665	15311	16284	17081	11505	14381	13275	9735
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		6800	8500	8500	8500	6800	8500	8500	8500	8500	8500	8500	8500	8500	6800
		in.lb		60180	75225	75225	75225	60180	75225	75225	75225	75225	75225	75225	75225	75225	60180
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		1750	2250	3000	3000	3000	3500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm		3400	4000	5000	5000	5000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 2000 rpm and 20°C gearhead temperature)	T_{012}	Nm		24	18	13	7,0	5,0	5,0	4,5	4,0	3,5	3,0	2,5	2,5	2,5	2,0
		in.lb		212	159	115	62	44	44	40	35	31	27	22	22	22	18
Max. torsional backlash	j_t	arcmin		Standard ≤ 4 / Reduced ≤ 2					Standard ≤ 5 / Reduced ≤ 4								
Torsional rigidity	C_{t21}	Nm/ arcmin		550					550								
		in.lb/ arcmin		4868					4868								
Max. axial force [c]	F_{2AMax}	N		33000					33000								
		lb_f		7425					7425								
Max. radial force [c]	F_{2RMax}	N		30000					30000								
		lb_f		6750					6750								
Max. tilting moment	M_{2KMax}	Nm		5000					5000								
		in.lb		44250					44250								
Efficiency at full load	η	%		98.5					96.5								
Service life (For calculation, see the Chapter "Information")	L_h	h		> 30000					> 30000								
Weight incl. standard adapter plate	m	kg		77					76								
		lb_m		170					168								
Operating noise (with i=10 and n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 66													
Max. permitted housing temperature		°C		+90													
		F		194													
Ambient temperature		°C		0 to +40													
		F		32 to 104													
Lubrication				Lubricated for life													
Paint				Blue RAL 5002													
Direction of rotation				Motor and gearhead same direction													
Protection class				IP 65													
Moment of inertia (relates to the drive)	M	48	J_1	kgcm²	-	-	-	-	-	39.2	34.6	33.2	30.5	29.7	28.2	27.9	27.6	27.5
				10^{-3} in.lb.s²						34.7	30.6	29.4	27.0	26.3	25.0	24.7	24.4	24.3
Clamping hub diameter [mm]	O	60	J_1	kgcm²	260.2	198.2	163.0	84.4	70.8	-	-	-	-	-	-	-	-	-
				10^{-3} in.lb.s²	230.3	175.4	144.3	74.7	62.7									

Reduced mass moments of inertia available on request.

[a] Other ratios available on request
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft or flange

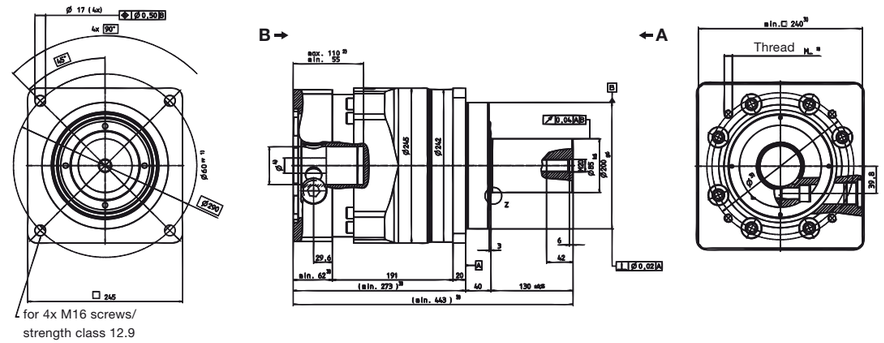
View A

View B

Motor shaft diameter [mm]

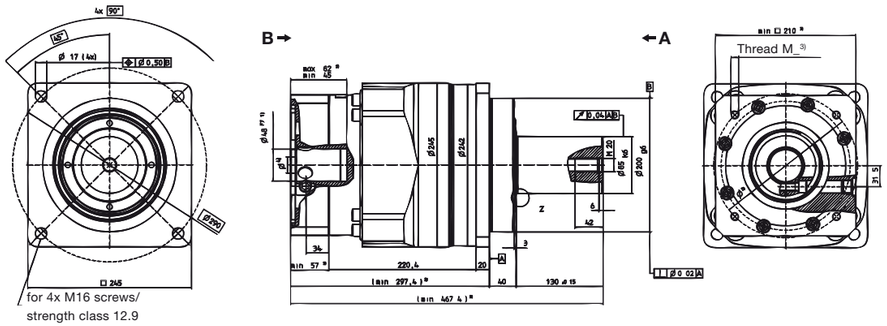
up to 60 [4] (O) clamping hub diameter

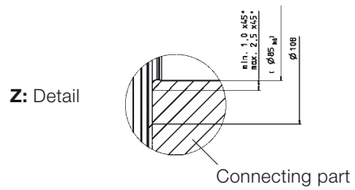
1-stage:



up to 48 [4] (M) clamping hub diameter

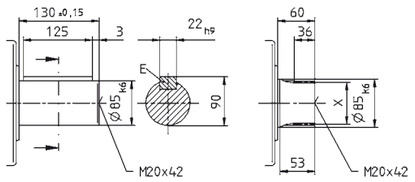
2-stage:





Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 80 x 2 x 30 x 38 x 6m, DIN 5480

Non-tolerated dimensions ± 1.5 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

LP⁺/LPB⁺ – Economical precision

A reliable and durable player among planetary gearheads

Output flange (LPB⁺)

NEMA flange

Belt pulley (PLPB)

Couplings

Shrink disc

Rack / Pinion

LP⁺/LPB⁺

Specifications \ Version	LP⁺/LPB⁺		
	+	++	+++
Positioning accuracy			
Rigidity			
Smooth-running			
Speed capacity			
Power density			
Max. axial/radial forces			

Options

Smooth output shaft
Output flange (LPB⁺)
Food-grade grease

Accessories

Rack / Pinion (see page 236)
Belt pulley (PLPB)
Couplings (see page 268)
Shrink disc (see page 202)
NEMA flange

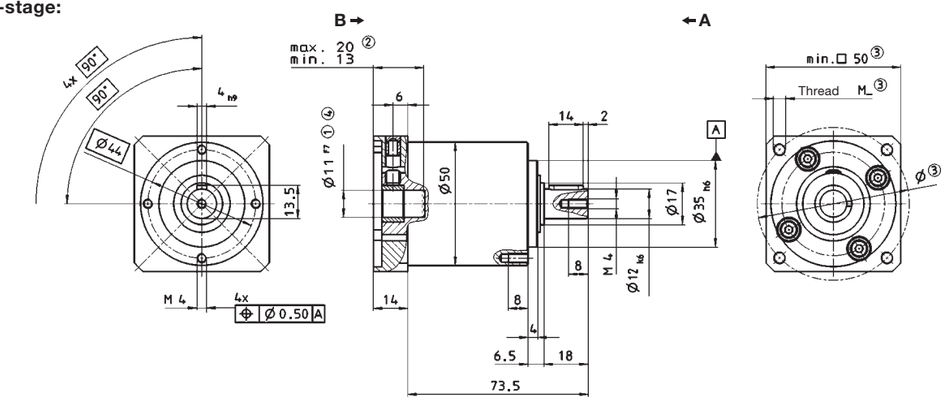
LP+ 050 1/2-stage

			1-stage				2-stage						
Ratio	i		**4**	**5**	**7**	**10**	**16**	**20**	**25**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	–	12	–	11	–	–	12	12	12	12	11
		in.lb	–	106	–	97	–	–	106	106	106	106	97
Nominal output torque (with n_{1N})	T_{2N}	Nm	–	5.7	–	5.2	–	–	5.7	5.7	5.7	5.7	5.2
		in.lb	–	50	–	46	–	–	50	50	50	50	46
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	–	26	–	26	–	–	26	26	26	26	26
		in.lb	–	230	–	230	–	–	230	230	230	230	230
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	–	4000	–	4000	–	–	4000	4000	4000	4000	4000
Max. input speed	n_{1Max}	rpm	–	8000	–	8000	–	–	8000	8000	8000	8000	8000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	–	0.05	–	0.05	–	–	0.05	0.05	0.05	0.05	0.05
		in.lb	–	0.44	–	0.44	–	–	0.44	0.44	0.44	0.44	0.44
Max. torsional backlash	j_t	arcmin	Standard ≤ 12 / Reduced ≤ 10				Standard ≤ 15 / Reduced ≤ 13						
Torsional rigidity	C_{t21}	Nm/ arcmin	–	1.2	–	0.85	–	–	1.2	1.2	1.2	1.2	0.85
		in.lb/ arcmin	–	10.6	–	7.5	–	–	10.6	10.6	10.6	10.6	7.5
Max. axial force [b]	F_{2AMax}	N	700				700						
		lb_f	158				158						
Max. radial force [b]	F_{2RMax}	N	650				650						
		lb_f	146				146						
Efficiency at full load	η	%	97				95						
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				> 20000						
Weight incl. standard adapter plate	m	kg	0.75				0.95						
		lb_m	1.7				2.1						
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Blue RAL 5002										
Direction of rotation			Motor and gearhead same direction										
Protection class			IP 64										
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	–	0.050	–	0.046	–	–	0.049	0.046	0.046	0.046	0.046
		10^{-3} in.lb.s²	–	0.044	–	0.041	–	–	0.043	0.041	0.041	0.041	0.041

[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 100 rpm

View A View B

LP+ 1-stage:



LP+ 2-stage:

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing. Motor shaft diameters up to 14mm available – please contact WITTENSTEIN alpha

⚠ Motor mounting according to operating manual

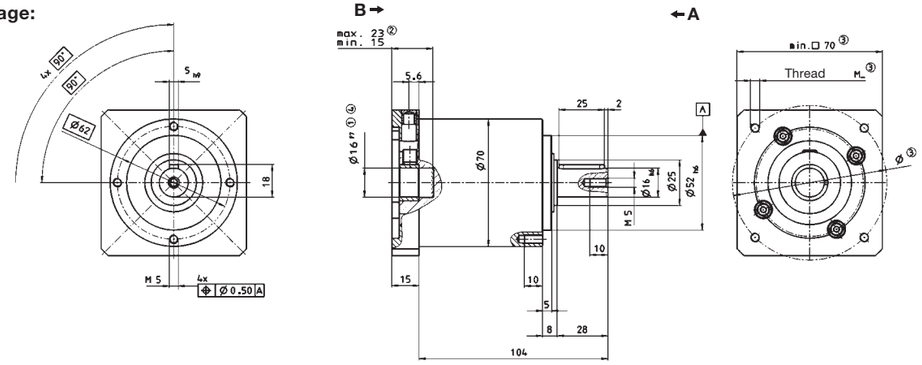
LP⁺/LPB⁺ 070 1/2-stage

				1-stage					2-stage								
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**15**	**16**	**20**	**25**	**30**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		32	35	35	35	32	32	35	35	35	32	35	35	35	32
		in.lb		283	310	310	310	283	283	310	310	310	283	310	310	310	283
Nominal output torque (with n_{1N})	T_{2N}	Nm		16.5	18	18	18	16.5	16.5	18	18	18	16.5	18	18	18	16.5
		in.lb		146	159	159	159	146	146	159	159	159	146	159	159	159	146
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		65	75	75	75	75	75	75	75	75	75	75	75	75	75
		in.lb		575	664	664	664	664	664	664	664	664	664	664	664	664	664
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700
Max. input speed	n_{1Max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm		0.30	0.25	0.20	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.10
		in.lb		2.7	2.2	1.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.9
Max. torsional backlash	j_t	arcmin		Standard ≤ 12 / Reduced ≤ 8					Standard ≤ 15 / Reduced ≤ 10								
Torsional rigidity	C_{t21}	Nm/ arcmin	LP⁺	2.8	3.3	3.3	3.3	2.8	2.8	3.3	3.3	3.3	2.8	3.3	3.3	3.3	2.8
		in.lb/ arcmin		25	29	29	29	25	25	29	29	29	25	29	29	29	25
			LPB⁺	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Max. axial force [c]	F_{2AMax}	N	LP⁺	1550					1550								
		lb_f		349					349								
Max. radial force	F_{2RMax}	N	LP⁺ [c]	1450					1450								
		lb_f		326					326								
		N	LPB⁺ [d]	3000					–								
		lb_f		675													
Efficiency at full load	η	%		97					95								
Service life (For calculation, see the Chapter "Information")	L_h	h		> 20000					> 20000								
Weight incl. standard adapter plate	m	kg	LP⁺	2.0					2.4								
		lb_m		4.4					5.3								
		kg	LPB⁺	1.6					–								
		lb_m		3.5													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 70													
Max. permitted housing temperature		°C		+90													
		F		194													
Ambient temperature		°C		0 to +40													
		F		32 to 104													
Lubrication				Lubricated for life													
Paint				Blue RAL 5002													
Direction of rotation				Motor and gearhead same direction													
Protection class				IP 64													
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	LP⁺	0.30	0.25	0.23	0.22	0.21	0.23	0.24	0.23	0.22	0.21	0.22	0.21	0.21	0.21
		10^{-3} in.lb.s²		0.27	0.22	0.20	0.19	0.19	0.20	0.21	0.20	0.19	0.19	0.19	0.19	0.19	0.19
		$kgcm^2$	LPB⁺	0.30	0.25	0.23	0.22	0.21	–	–	–	–	–	–	–	–	–
		10^{-3} in.lb.s²		0.27	0.22	0.20	0.19	0.19									

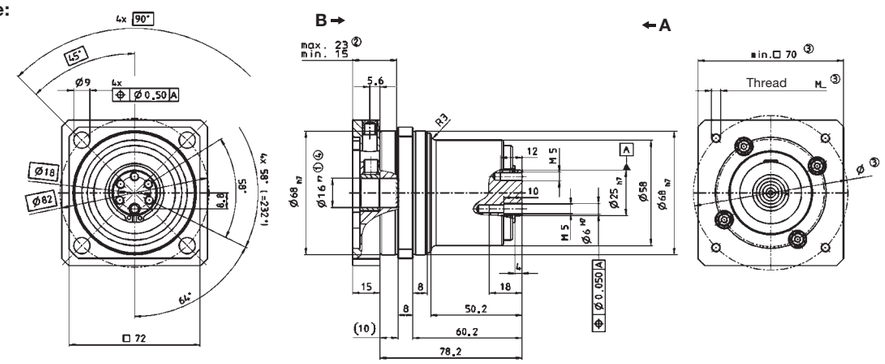
[a] LPB available with ratio 3, 4, 5, 7, 10
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft, if n_2 = 100 rpm
[d] With mounted PLPB⁺ belt pulley and 100 rpm

View A View B

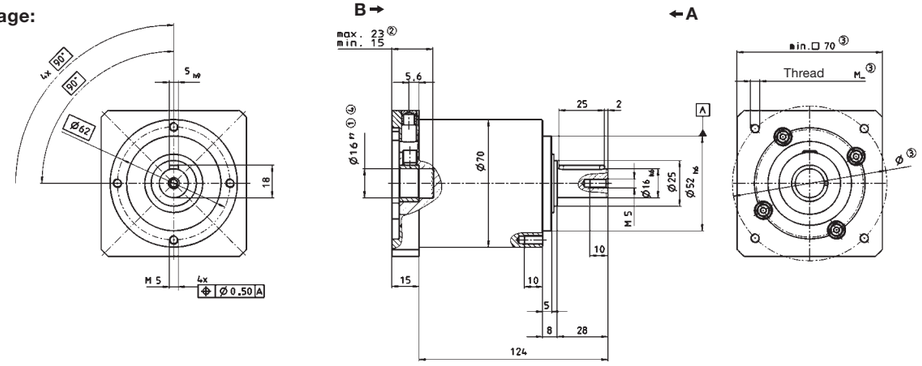
LP⁺ 1-stage:



LPB⁺ 1-stage:

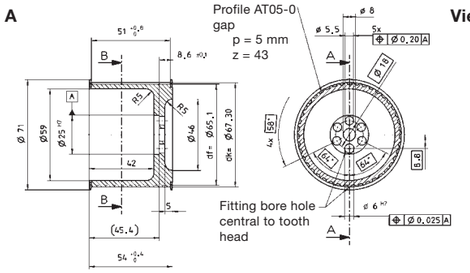


LP⁺ 2-stage:



Supplement: Belt pulley PLPB⁺

View A View B



PCD effective diameter			$d_0 = (z \cdot p) / \pi$
Weight	m	*kg*	0.48
		lb_m	1.06
Moment of inertia	J_1	$kgcm^2$	3.86
		10^{-3} in.lb.s²	3.41

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing. Motor shaft diameters up to 19mm available – please contact WITTENSTEIN alpha

⚠ Motor mounting according to operating manual

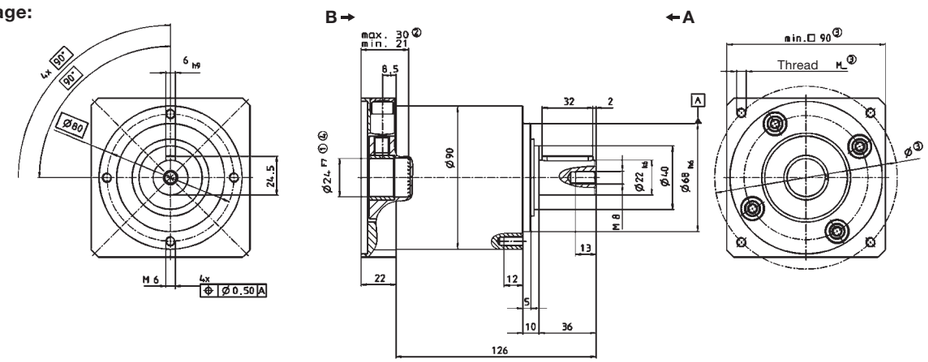
LP⁺/LPB⁺ 090 1/2-stage

				1-stage					2-stage								
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**15**	**16**	**20**	**25**	**30**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		80	90	90	90	80	80	90	90	90	80	90	90	90	80
		in.lb		708	797	797	797	708	708	797	797	797	708	797	797	797	708
Nominal output torque (with n_{1N})	T_{2N}	Nm		40	45	45	45	40	40	45	45	45	40	45	45	45	40
		in.lb		354	398	398	398	354	354	398	398	398	354	398	398	398	354
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		185	190	190	190	190	190	190	190	190	190	190	190	190	190
		in.lb		1637	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400
Max. input speed	n_{1Max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm		0.60	0.55	0.50	0.40	0.38	0.30	0.30	0.30	0.30	0.30	0.30	0.25	0.25	0.25
		in.lb		5.3	4.9	4.4	3.5	3.4	2.7	2.7	2.7	2.7	2.7	2.7	2.2	2.2	2.2
Max. torsional backlash	j_t	arcmin		Standard ≤ 12 / Reduced ≤ 8					Standard ≤ 15 / Reduced ≤ 10								
Torsional rigidity	C_{t21}	Nm/ arcmin	LP⁺	8.5	9.5	9.5	9.5	8.5	8.5	9.5	9.5	9.5	8.5	9.5	9.5	9.5	8.5
		in.lb/ arcmin		75	84	85	85	75	75	84	84	84	75	84	84	84	75
			LPB⁺	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Max. axial force [c]	F_{2AMax}	N	LP⁺	1900					1900								
		lb$_f$		428					428								
Max. radial force	F_{2RMax}	N	LP⁺ [c]	2400					2400								
		lb$_f$		540					540								
		N	LPB⁺ [d]	4300					–								
		lb$_f$		967.5													
Efficiency at full load	η	%		97					95								
Service life (For calculation, see the Chapter “Information”)	L_h	h		> 20000					> 20000								
Weight incl. standard adapter plate	m	kg	LP⁺	4.0					5.0								
		lb$_m$		8.8					11.1								
		kg	LPB⁺	3.3					–								
		lb$_m$		7.3													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 72													
Max. permitted housing temperature		°C		+90													
		F		194													
Ambient temperature		°C		0 to +40													
		F		32 to 104													
Lubrication				Lubricated for life													
Paint				Blue RAL 5002													
Direction of rotation				Motor and gearhead same direction													
Protection class				IP 64													
Moment of inertia (relates to the drive)	J_1	kgcm²	LP⁺	1.83	1.62	1.55	1.47	1.43	1.50	1.49	1.55	1.42	1.42	1.47	1.42	1.42	1.42
		10⁻³ in.lb.s²		1.62	1.43	1.37	1.30	1.27	1.33	1.32	1.37	1.26	1.26	1.30	1.26	1.26	1.26
		kgcm²	LPB⁺	1.82	1.62	1.54	1.47	1.43	–	–	–	–	–	–	–	–	–
		10⁻³ in.lb.s²		1.61	1.43	1.36	1.30	1.27									

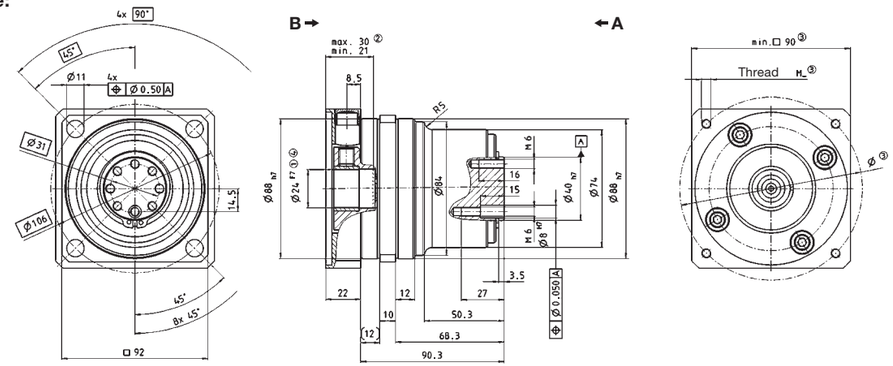
[a] LPB available with ratio 3, 4, 5, 7, 10
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft, if n_2 = 100 rpm
[d] With mounted PLPB⁺ belt pulley and 100 rpm

View A View B

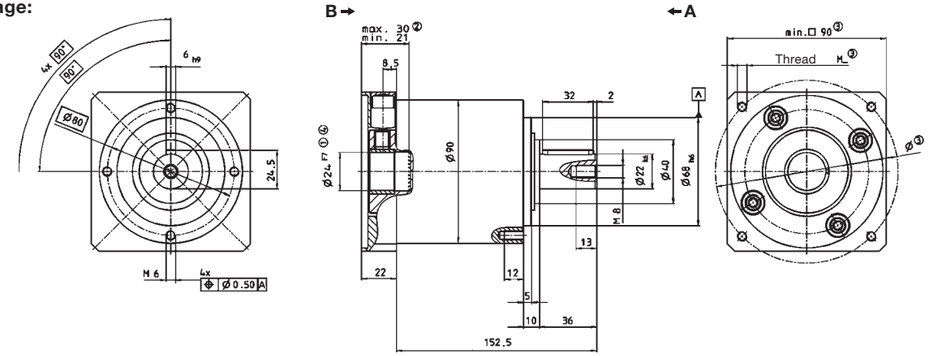
LP⁺ 1-stage:



LPB⁺ 1-stage:

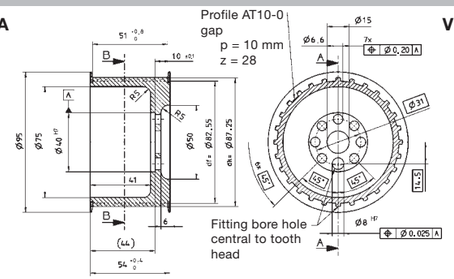


LP⁺ 2-stage:



Supplement: Belt pulley PLPB⁺

View A **View B**



PCD effective diameter			$d_0 = (z \cdot p) / \pi$
Weight	m	kg	0.82
		lb$_m$	1.81
Moment of inertia	J_1	kgcm²	10.95
		10⁻³ in.lb.s²	9.69

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

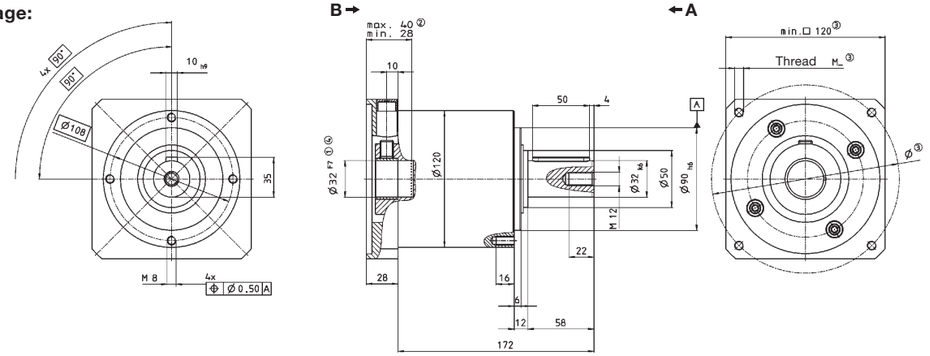
LP⁺/LPB⁺ 120 1/2-stage

				1-stage					2-stage								
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**15**	**16**	**20**	**25**	**30**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		200	200	220	220	200	200	220	220	220	200	220	220	220	200
		in.lb		1770	1770	1947	1947	1770	1770	1947	1947	1947	1770	1947	1947	1947	1770
Nominal output torque (with n_{1N})	T_{2N}	Nm		100	110	110	110	100	100	110	110	110	100	110	110	110	100
		in.lb		885	974	974	974	885	885	974	974	974	885	974	974	974	885
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		400	480	480	480	480	480	480	480	480	480	480	480	480	480
		in.lb		3540	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b]	n_{1N}	rpm		2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
Max. input speed	n_{1Max}	rpm		4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm		1.1	1.0	0.9	0.8	0.8	0.6	0.55	0.5	0.5	0.4	0.4	0.4	0.4	0.4
		in.lb		9.7	8.9	8.0	7.1	7.1	5.3	4.9	4.4	4.4	3.5	3.5	3.5	3.5	3.5
Max. torsional backlash	j_t	arcmin		Standard ≤ 12 / Reduced ≤ 8					Standard ≤ 15 / Reduced ≤ 10								
Torsional rigidity	C_{t21}	Nm/ arcmin	LP⁺	22	25	25	25	22	22	25	25	25	22	25	25	25	22
		in.lb/ arcmin		195	221	221	221	195	195	221	221	221	195	221	221	221	195
			LPB⁺	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Max. axial force [c]	F_{2AMax}	N	LP	4000					4000								
		lb_f		900					900								
Max. radial force	F_{2RMax}	N	LP⁺ [c]	4600					4600								
		lb_f		1035					1035								
		N	LPB⁺ [d]	9500					–								
		lb_f		2138													
Efficiency at full load	η	%		97					95								
Service life (For calculation, see the Chapter "Information")	L_h	h		> 20000					> 20000								
Weight incl. standardadapter plate	m	kg	LP⁺	8.6					11.0								
		lb_m		19.0					24.3								
		kg	LPB⁺	7.3					–								
		lb_m		16.1													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 74													
Max. permitted housing temperature		°C		+90													
		F		194													
Ambient temperature		°C		0 to +40													
		F		32 to 104													
Lubrication				Lubricated for life													
Paint				Blue RAL 5002													
Direction of rotation				Motor and gearhead same direction													
Protection class				IP 64													
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	LP⁺	6.90	5.94	5.58	5.24	5.06	5.35	5.53	5.53	5.30	5.00	5.30	4.99	4.99	4.99
		10^{-3} in.lb.s²		6.11	5.26	4.94	4.64	4.48	4.73	4.89	4.89	4.69	4.43	4.69	4.42	4.42	4.42
		$kgcm^2$	LPB⁺	6.84	5.91	5.56	5.24	5.06	–	–	–	–	–	–	–	–	–
		10^{-3} in.lb.s²		6.05	5.23	4.92	4.64	4.48									

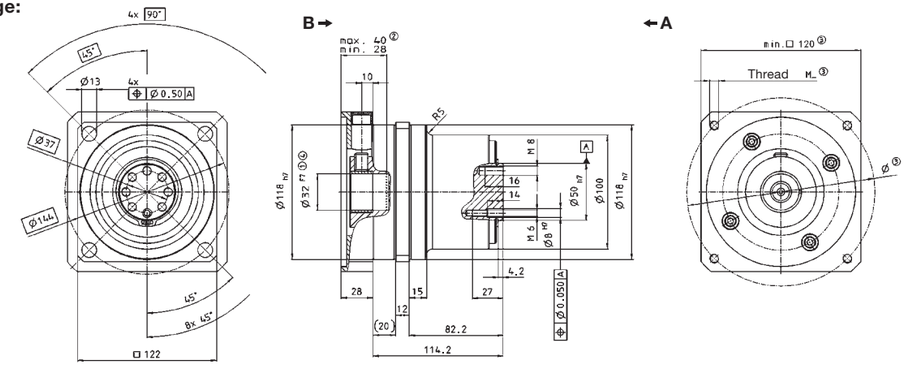
[a] LPB available with ratio 3, 4, 5, 7, 10
[b] For higher ambient temperatures, please reduce input speed
[c] Refers to center of the output shaft, if n_2 = 100 rpm
[d] With mounted PLPB⁺ belt pulley and 100 rpm

View A View B

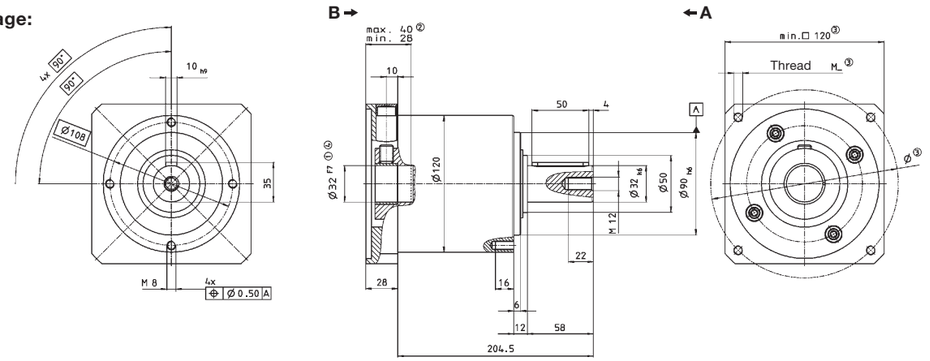
LP⁺ 1-stage:



LPB⁺ 1-stage:

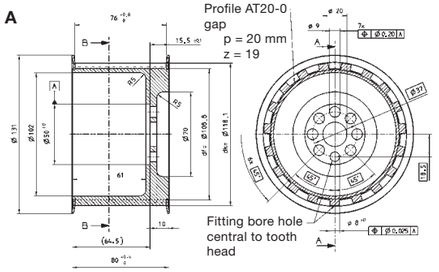


LP⁺ 2-stage:



Supplement: Belt pulley PLPB⁺

View A **View B**



PCD effective diameter			$d_0 = (z \cdot p) / \pi$
Weight	m	kg	2.61
		lb_m	5.77
Moment of inertia	J_1	$kgcm^2$	50.62
		10^{-3} in.lb.s²	44.80

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

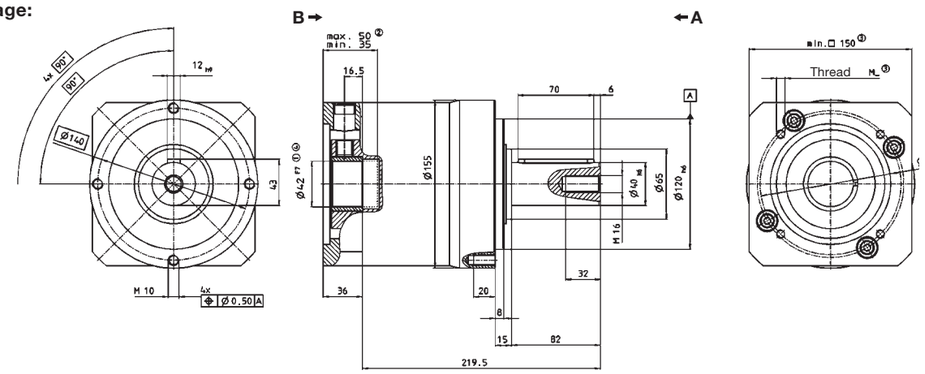
⚠ Motor mounting according to operating manual

LP+ 155 1/2-stage

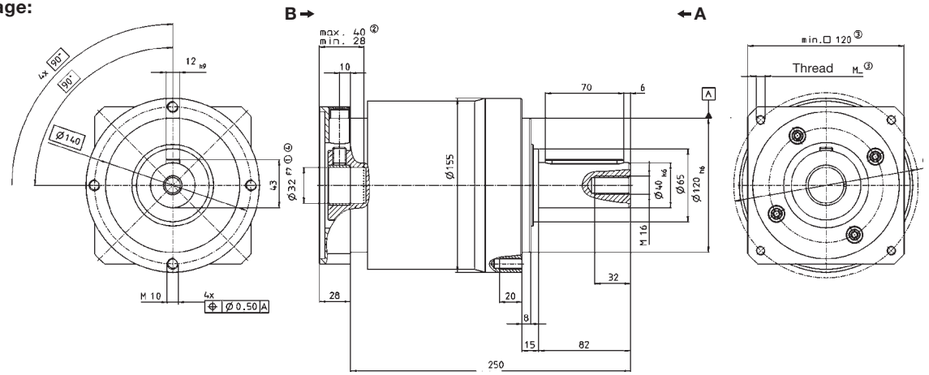
			1-stage		2-stage		
Ratio	i		**5**	**10**	**25**	**50**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	450	350	450	450	350
		in.lb	3983	3098	3983	3983	3098
Nominal output torque (with n_{1N})	T_{2N}	Nm	320	190	320	320	190
		in.lb	2832	1682	2832	2832	1682
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1000	1000	1000	1000	1000
		in.lb	8850	8850	8850	8850	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	2000	2000	2000	2000	2000
Max. input speed	n_{1Max}	rpm	3600	3600	3600	3600	3600
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	2.8	2.5	1.0	0.8	0.7
		in.lb	24.8	22.1	8.9	7.1	6.2
Max. torsional backlash	j_t	arcmin	Standard ≤ 12 / Reduced ≤ 8		Standard ≤ 15 / Reduced ≤ 10		
Torsional rigidity	C_{t21}	Nm/ arcmin	55	44	55	55	44
		in.lb/ arcmin	487	389	487	487	389
Max. axial force [b]	F_{2AMax}	N	6000		6000		
		lb_f	1350		1350		
Max. radial force [b]	F_{2RMax}	N	7500		7500		
		lb_f	1688		1688		
Efficiency at full load	η	%	97		95		
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000		> 20000		
Weight incl. standard adapter plate	m	kg	17.0		21.0		
		lb_m	37.6		46.4		
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 75				
Max. permitted housing temperature		°C	+90				
		F	194				
Ambient temperature		°C	0 to +40				
		F	32 to 104				
Lubrication			Lubricated for life				
Paint			Blue RAL 5002				
Direction of rotation			Motor and gearhead same direction				
Protection class			IP 64				
Moment of inertia (relates to the drive)	J_1	kgcm²	17.1	15.7	5.4	5.0	5.0
		10^{-3} in.lb.s²	15.1	13.9	4.8	4.4	4.4

[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 100 rpm

LP+ 1-stage:



LP+ 2-stage:



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

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Options

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Accessories

Rack / Pinion (see page 236)
Couplings (see page 268)
NEMA flange
Shrink disc (see page 202)

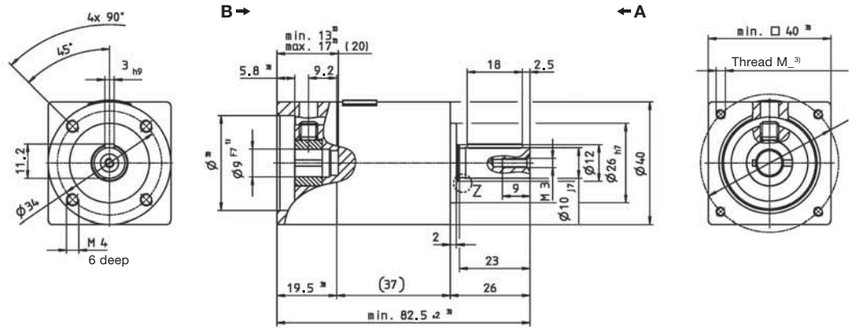
alphira 040 1/2-stage

			1-stage				2-stage						
Ratio	i		**4**	**5**	**7**	**10**	**16**	**20**	**25**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	–	11.5	11.5	10.5	–	–	11.5	11.5	11.5	11.5	10.5
		in.lb	–	102	102	93	–	–	102	102	102	102	93
Nominal output torque (with n_{1N})	T_{2N}	Nm	–	5.7	5.7	5.2	–	–	5.7	5.7	5.7	5.7	5.2
		in.lb	–	50	50	46	–	–	50	50	50	50	46
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	–	26	26	26	–	–	26	26	26	26	26
		in.lb	–	230	230	230	–	–	230	230	230	230	230
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	–	4000	4000	4000	–	–	4000	4000	4000	4000	4000
Max. input speed	n_{1Max}	rpm	–	8000	8000	8000	–	–	8000	8000	8000	8000	8000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	–	0.05	0.05	0.05	–	–	0.05	0.05	0.05	0.05	0.05
		in.lb	–	0.44	0.44	0.44	–	–	0.44	0.44	0.44	0.44	0.44
Max. torsional backlash	j_t	arcmin	≤ 20				≤ 25						
Torsional rigidity	C_{t21}	Nm/ arcmin	–	0.58	0.58	0.52	–	–	0.58	0.58	0.58	0.58	0.52
		in.lb/ arcmin	–	5.1	5.1	4.6	–	–	5.1	5.1	5.1	5.1	4.6
Max. axial force [b]	F_{2AMax}	N	230				230						
		lb_f	51				51						
Max. radial force [b]	F_{2RMax}	N	200				200						
		lb_f	45				45						
Efficiency at full load	η	%	97				95						
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000				> 20000						
Weight incl. standard adapter plate	m	kg	0.31				0.52						
		lb_m	0.69				1.15						
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Alu, polished										
Direction of rotation			Motor and gearhead same direction										
Protection class			IP 64										
Moment of inertia (relates to the drive)	J_1	kgcm²	–	0.04	0.04	0.04	–	–	0.04	0.04	0.04	0.04	0.04
		10^{-3} in.lb.s²	–	0.036	0.036	0.036	–	–	0.036	0.036	0.036	0.036	0.036

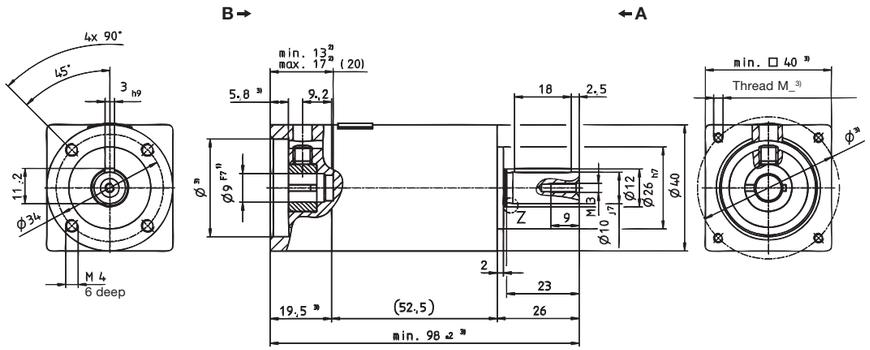
[a] For higher ambient temperatures, please reduce input speed
[b] Relates to center of the output shaft or flange, at 100 rpm

View A View B

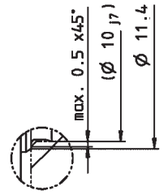
1-stage:



2-stage:



Z: Detail



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

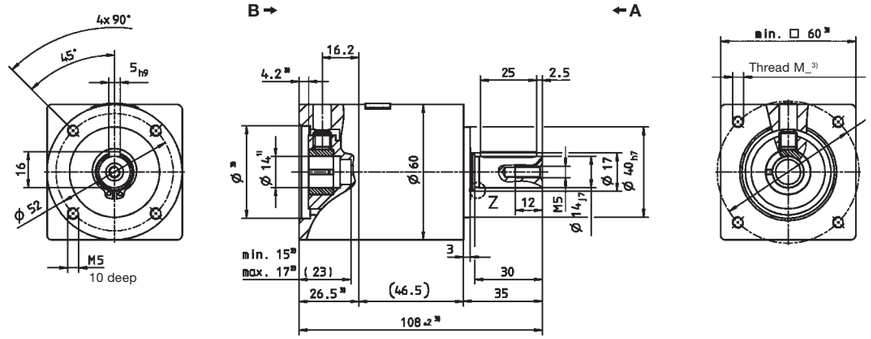
alphira 060 1/2-stage

			1-stage				2-stage						
Ratio	i		**4**	**5**	**7**	**10**	**16**	**20**	**25**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	32	32	32	29	32	32	32	32	32	32	29
		in.lb	283	283	283	257	283	283	283	283	283	283	257
Nominal output torque (with n_{1N})	T_{2N}	Nm	16	16	16	15	16	16	16	16	16	16	15
		in.lb	142	142	142	133	142	142	142	142	142	142	133
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	75	75	75	75	75	75	75	75	75	75	75
		in.lb	664	664	664	664	664	664	664	664	664	664	664
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
		in.lb	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Max. torsional backlash	j_t	arcmin	≤ 20				≤ 25						
Torsional rigidity	C_{t21}	Nm/ arcmin	2.1	2.1	2.1	1.9	2.1	2.1	2.1	2.1	2.1	2.1	1.9
		in.lb/ arcmin	19	19	19	17	19	19	19	19	19	19	17
Max. axial force [b]	F_{2AMax}	N	750				750						
		lb_f	169				169						
Max. radial force [b]	F_{2RMax}	N	650				650						
		lb_f	146				146						
Efficiency at full load	η	%	97				95						
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				> 20000						
Weight incl. standard adapter plate	m	kg	0.88				1.1						
		lb_m	1.9				2.4						
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Alu, polished										
Direction of rotation			Motor and gearhead same direction										
Protection class			IP 64										
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
		10^{-3} in.lb.s²	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

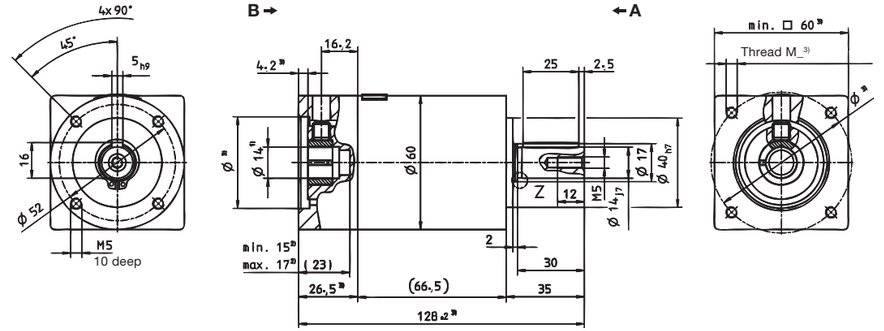
[a] For higher ambient temperatures, please reduce input speed
[b] Relates to center of the output shaft or flange, at 100 rpm

View A View B

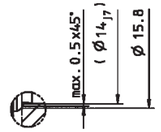
1-stage:



2-stage:



Z: Detail



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

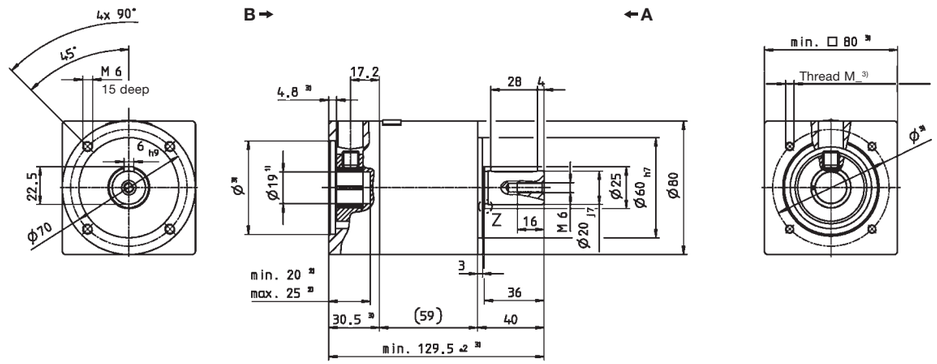
alphira 080 1/2-stage

			1-stage				2-stage						
Ratio	i		**4**	**5**	**7**	**10**	**16**	**20**	**25**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	80	80	80	72	80	80	80	80	80	80	72
		in.lb	708	708	708	637	708	708	708	708	708	708	637
Nominal output torque (with n_{2N})	T_{2N}	Nm	40	40	40	35	40	40	40	40	40	40	35
		in.lb	354	354	354	310	354	354	354	354	354	354	310
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	190	190	190	190	190	190	190	190	190	190	190
		in.lb	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
		in.lb	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Max. torsional backlash	j_t	arcmin	≤ 20				≤ 25						
Torsional rigidity	C_{t21}	Nm/ arcmin	6.1	6.1	6.1	5.5	6.1	6.1	6.1	6.1	6.1	6.1	5.5
		in.lb/ arcmin	54	54	54	49	54	54	54	54	54	54	49
Max. axial force [b]	F_{2AMax}	N	1600				1600						
		lb_f	360				360						
Max. radial force [b]	F_{2RMax}	N	1200				1200						
		lb_f	270				270						
Efficiency at full load	η	%	97				95						
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				> 20000						
Weight incl. standard adapter plate	m	kg	2.1				2.8						
		lb_m	4.6				6.2						
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 70										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Alu, polished										
Direction of rotation			Motor and gearhead same direction										
Protection class			IP 64										
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
		10^{-3} in.lb.s²	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48

[a] For higher ambient temperatures, please reduce input speed
[b] Relates to center of the output shaft or flange, at 100 rpm

View A View B

1-stage:



2-stage:

Z: Detail

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

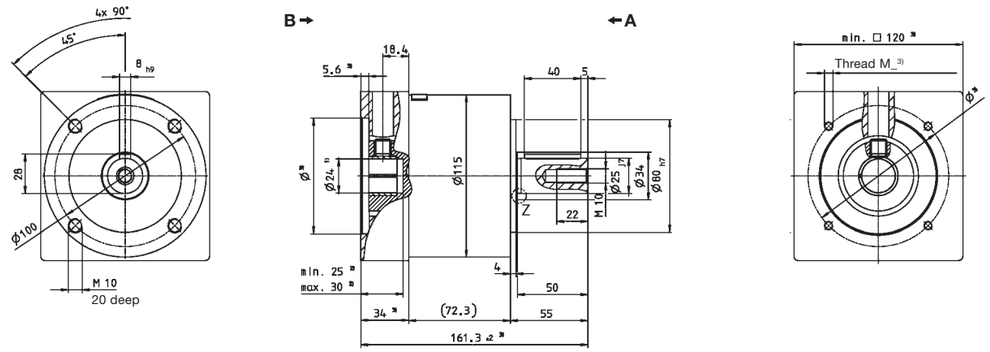
alphira 115 1/2-stage

			1-stage				2-stage						
Ratio	i		**4**	**5**	**7**	**10**	**16**	**20**	**25**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	200	200	200	180	200	200	200	200	200	200	180
		in.lb	1770	1770	1770	1593	1770	1770	1770	1770	1770	1770	1593
Nominal output torque (with n_{1N})	T_{2N}	Nm	100	100	100	90	100	100	100	100	100	100	90
		in.lb	885	885	885	797	885	885	885	885	885	885	797
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	480	480	480	480	480	480	480	480	480	480	480
		in.lb	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
Max. input speed	n_{1Max}	rpm	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		in.lb	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Max. torsional backlash	j_t	arcmin	≤ 20				≤ 25						
Torsional rigidity	C_{t21}	Nm/ arcmin	16.5	16.5	16.5	14.5	16.5	16.5	16.5	16.5	16.5	16.5	14.5
		in.lb/ arcmin	146	146	146	128	146	146	146	146	146	146	128
Max. axial force [b]	F_{2AMax}	N	2100				2100						
		lb_f	472				472						
Max. radial force [b]	F_{2RMax}	N	1550				1550						
		lb_f	349				349						
Efficiency at full load	η	%	97				95						
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000				> 20000						
Weight incl. standard adapter plate	m	kg	5.2				6.9						
		lb_m	11.5				15.2						
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 72										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Alu, polished										
Direction of rotation			Motor and gearhead same direction										
Protection class			IP 64										
Moment of inertia (relates to the drive)	J_1	kgcm²	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82
		10^{-3} in.lb.s²	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61

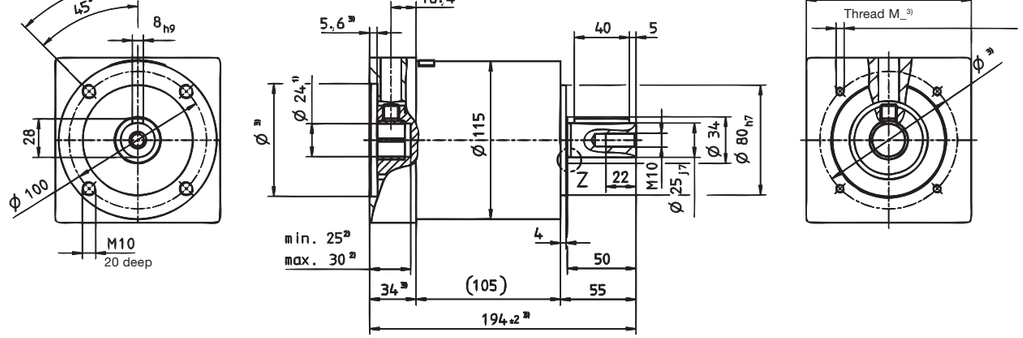
[a] For higher ambient temperatures, please reduce input speed
[b] Relates to center of the output shaft or flange, at 100 rpm

View A View B

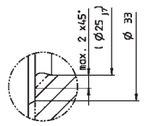
1-stage:



2-stage:



Z: Detail



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

Just around the corner – Servo right-angle systems for increased efficiency.

Manufacturers of flexible, high-quality machines with a wide range of functions are extremely demanding when it comes to drive systems: Maximum dynamics and performance density, minimal space and monitoring requirements, extremely smooth-running and robust, simple setup, maintenance-free are just some of the many requirements. Servo right-angle systems by WITTENSTEIN alpha fulfill all these expectations – and even go one step further: Sensational results and an excellent design.

TK+ **TPK+** **SK+** **SPK+** **HG+** **LK+** **LPK+** **V-DRIVE®**

Servo right-angle gearheads

Increased productivity

Do you need a machine that operates at maximum productivity? Your servo right-angle gearhead offers 200 % more torque, 100 % faster speeds than equivalent products and thus creates the perfect conditions for maximum manufacturing efficiency.

Simple and convenient

From an optimized design with our cymex® software to the classic, patented WITTENSTEIN alpha motor attachment and an oil volume adapted to each model – WITTENSTEIN alpha right-angle gearheads make your life so much easier.

Reliable and accurate

The low torsional backlash and high torsional rigidity of your WITTENSTEIN alpha right-angle gearhead assure maximum positioning accuracy of your drives and precision of your machines – even during highly dynamic operation up to 50,000 cycles/hour.

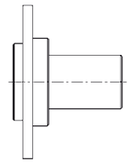
Maximum durability

Your WITTENSTEIN alpha right-angle gearhead is extremely reliable due to the overall design and 100 % WITTENSTEIN alpha inspections: **“fit it and forget it”**. A length compensation feature integrated in your WITTENSTEIN alpha right-angle gearhead as standard maximizes the lifespan of your servo motor during high-speed continuous operation.

TK⁺/TPK⁺ – New right-angle precision

The successor to our versatile hypoid gearhead with TP+ compatible output flange and hollow shaft, with optional planetary stage

See our website and our separate flyer for more information about our washdown solutions



Shaft output

Clamping set

Rack / Pinion

TK+ with spindle

Couplings

TK⁺/TPK⁺

Specifications \ Version	TK⁺/TPK⁺		
	+	++	+++
Positioning accuracy		TK⁺	
			TPK⁺
Rigidity		TK⁺	
			TPK⁺
Smooth-running		TK⁺	
		TPK⁺	
Speed capacity		TK⁺	
		TPK⁺	
Power density		TK⁺	
			TPK⁺
Max. axial/radial forces		TK⁺	
			TPK⁺

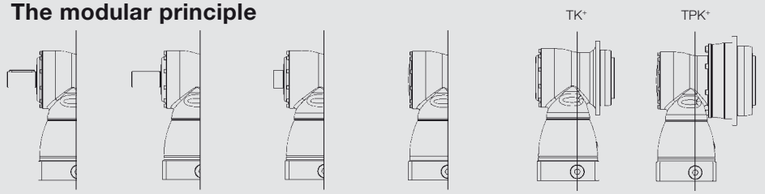
Options

Plug-in drive coupling
Washdown version
ATEX version
Food-grade grease

Accessories

Rack / Pinion (see page 236)
Shrink disc (see page 202)
Coupling: BCT (see page 282)
TK⁺ with spindle
Shaft output

The modular principle



TK+ 004 1/2-stage

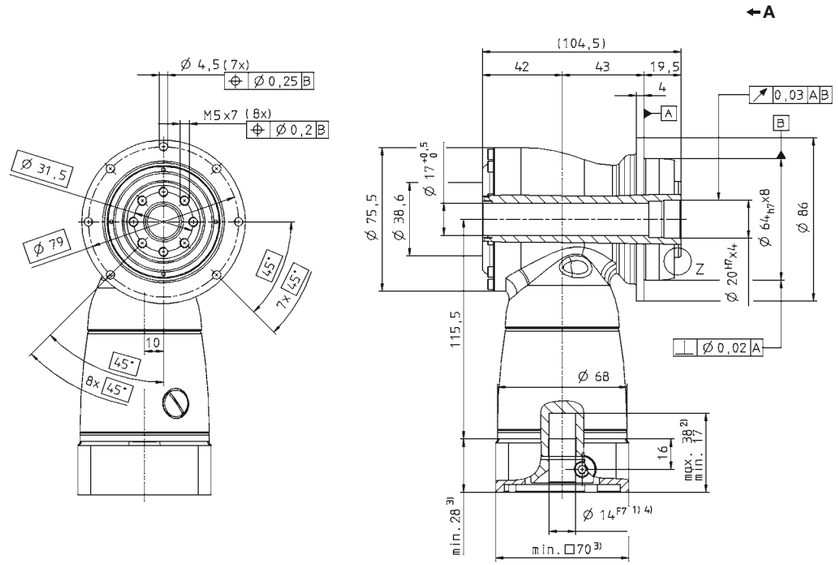
				1-stage					2-stage									
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	30	30	30	25	20	30	30	30	30	30	30	30	30	25	20
			in.lb	266	266	266	221	177	266	266	266	266	266	266	266	266	221	177
Nominal output torque (with n_{1N})	T_{2N}		Nm	22	22	22	20	15	22	22	22	22	22	22	22	22	20	15
			in.lb	195	195	195	177	133	195	195	195	195	195	195	195	195	177	133
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	40	50	50	45	40	50	50	50	50	50	50	50	50	45	40
			in.lb	354	443	443	398	354	443	443	443	443	443	443	443	443	398	354
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}		rpm	2200	2400	2700	2700	2700	4400	4400	4400	4400	4400	4400	4400	4800	5500	5500
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}		rpm	2700	3100	3600	3100	3100	5000	5000	5000	5000	5000	5000	5000	5000	5500	5500
Max. input speed	n_{1Max}		rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}		Nm	1.4	1.3	1.2	1.4	1.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
			in.lb	12.4	11.5	10.6	12.4	11.5	1.8	1.8	1.8	1.8	1.8	1.8	0.9	0.9	0.9	0.9
Max. torsional backlash	j_t		arcmin	≤ 5														
Torsional rigidity	C_{t21}		Nm/ arcmin	2.6	2.8	3.0	2.6	2.3	2.8	2.8	2.8	2.8	2.8	2.8	2.8	3.0	2.6	2.3
			in.lb/ arcmin	23	25	26	23	20	25	25	25	25	25	25	25	26	23	20
Max. axial force [e]	F_{2AMax}		N	2400														
			lb_f	540														
Max. radial force [e]	F_{2RMax}		N	2700														
			lb_f	608														
Max. tilting moment	M_{2KMax}		Nm	251														
			in.lb	2220														
Efficiency at full load	η		%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h		h	> 20000														
Weight incl. standard adapter plate	m		kg	2.9					3.2									
			lb_m	6.4					7.1									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}		dB(A)	≤ 64														
Max. permitted housing temperature			°C	+90														
			F	194														
Ambient temperature			°C	0 to +40														
			F	32 to 104														
Lubrication				Lubricated for life														
Paint				Blue RAL 5002														
Direction of rotation				Motor and gearhead opposite directions														
Protection class				IP 65														
Moment of inertia (relates to the drive)	B	11	J_1	kgcm²	–	–	–	–	–	0.09	0.09	0.08	0.07	0.06	0.06	0.06	0.06	0.06	0.06
				10^{-3} in.lb.s²						0.08	0.08	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.05
Clamping hub diameter [mm]	C	14	J_1	kgcm²	0.57	0.46	0.41	0.37	0.35	0.21	0.20	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.17
				10^{-3} in.lb.s²	0.50	0.41	0.36	0.33	0.31	0.18	0.18	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15
	E	19	J_1	kgcm²	0.92	0.82	0.76	0.72	0.70	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	0.81	0.72	0.68	0.64	0.62										

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:



2-stage:

See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TK+ 010 1/2-stage

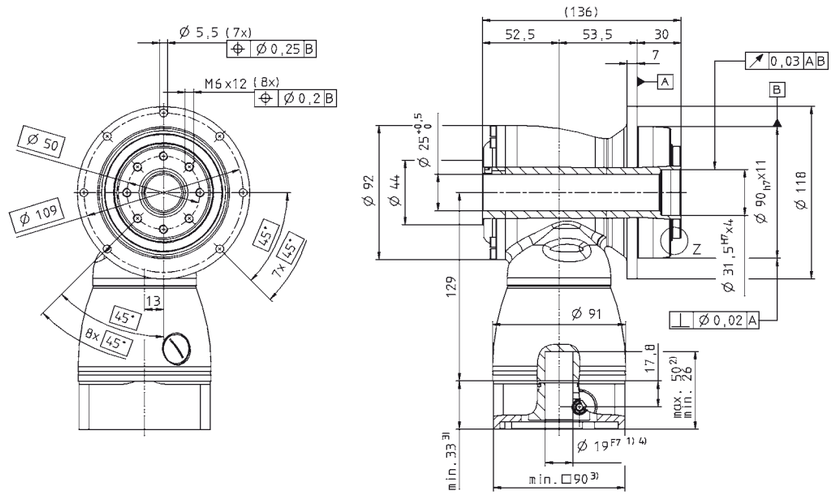
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	70	70	70	60	50	70	70	70	70	70	70	70	70	60	50
		in.lb	620	620	620	531	443	620	620	620	620	620	620	620	620	531	443
Nominal output torque (with n_{1N})	T_{2N}	Nm	50	50	50	45	40	50	50	50	50	50	50	50	50	45	40
		in.lb	443	443	443	398	354	443	443	443	443	443	443	443	443	398	354
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	95	115	115	110	100	115	115	115	115	115	115	115	115	110	100
		in.lb	841	1018	1018	974	885	1018	1018	1018	1018	1018	1018	1018	1018	974	885
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2100	2200	2500	2500	2500	3500	3500	3500	3500	3500	3500	3500	3800	4500	4500
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2700	3100	3600	3100	3100	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	2.4	2.0	1.8	2.4	2.2	0.4	0.4	0.3	0.3	0.3	0.3	0.1	0.1	0.1	0.1
		in.lb	21	18	16	21	19	3.5	3.5	2.7	2.7	2.7	2.7	0.9	0.9	0.9	0.9
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	6.0	7.0	8.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	8.0	8.0	8.0
		in.lb/ arcmin	53	62	71	71	71	62	62	62	62	62	62	62	71	71	71
Max. axial force [e)]	F_{2AMax}	N	3400														
		lb_f	765														
Max. radial force [e)]	F_{2RMax}	N	4000														
		lb_f	900														
Max. tilting moment	M_{2KMax}	Nm	437														
		in.lb	3867														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standard adapter plate	m	kg	5.3					6.1									
		lb_m	11.7					13.5									
Operating noise (with n_1 = 3000 rpm no load)	L_{pA}	dB(A)	≤ 66														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive)	C	14	J_1	kgcm²	–	–	–	–	–	0.31	0.28	0.24	0.23	0.21	0.20	0.19	0.18	0.18	0.18
				10^{-3} in.lb.s²						0.27	0.25	0.21	0.21	0.18	0.18	0.17	0.16	0.16	0.16
Clamping hub diameter [mm]	E	19	J_1	kgcm²	1.81	1.39	1.18	1.02	0.93	0.75	0.72	0.68	0.68	0.63	0.63	0.63	0.63	0.63	0.63
				10^{-3} in.lb.s²	1.60	1.23	1.05	0.90	0.82	0.64	0.64	0.61	0.60	0.59	0.55	0.56	0.56	0.55	0.55
	H	28	J_1	kgcm²	3.22	2.80	2.60	2.43	2.34	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	2.85	2.48	2.30	2.15	2.07										

[a)] Other ratios available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

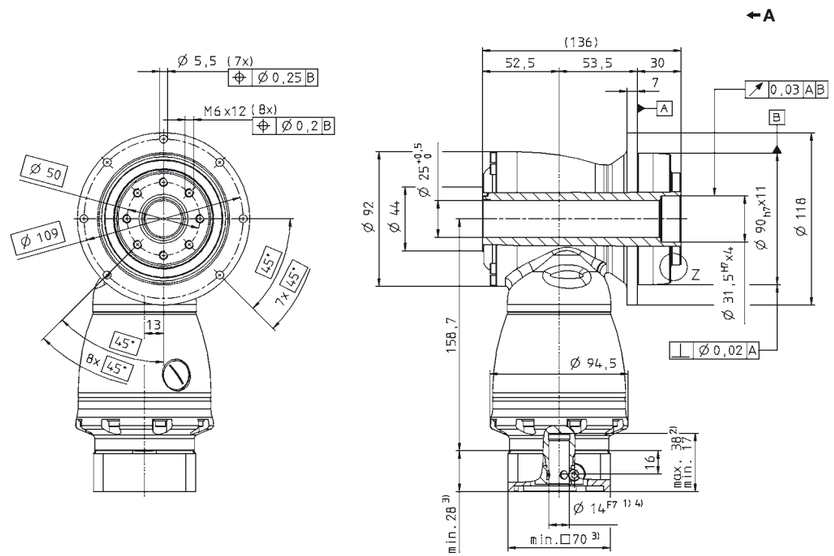
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:



2-stage:



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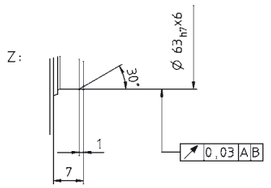


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TK+ 025 1/2-stage

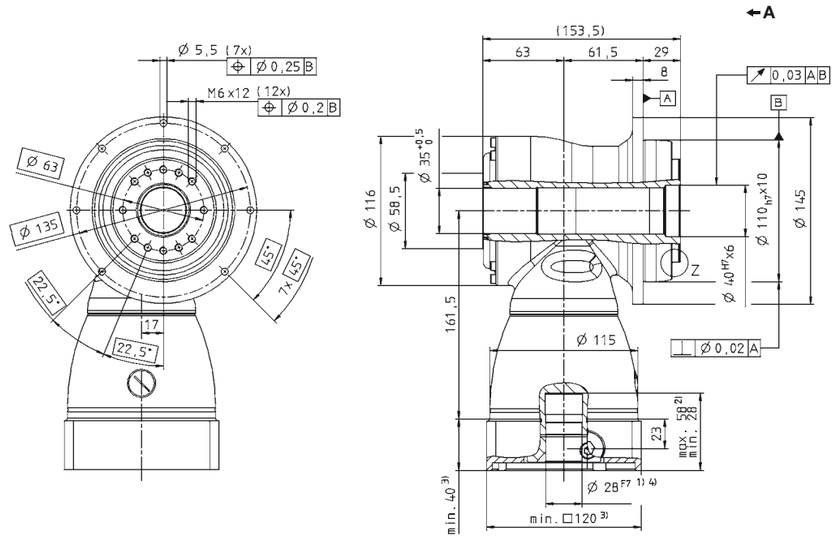
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	170	170	170	145	125	170	170	170	170	170	170	170	170	145	125
		in.lb	1505	1505	1505	1283	1106	1505	1505	1505	1505	1505	1505	1505	1505	1283	1106
Nominal output torque (with n_{1N})	T_{2N}	Nm	100	100	100	90	80	100	100	100	100	100	100	100	100	90	80
		in.lb	885	885	885	797	708	885	885	885	885	885	885	885	885	797	708
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	220	260	260	255	250	260	260	260	260	260	260	260	260	255	250
		in.lb	1947	2301	2301	2257	2213	2301	2301	2301	2301	2301	2301	2301	2301	2257	2213
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	2000	2100	2400	2200	2200	3100	3100	3100	3100	3100	3100	3100	3500	4200	4200
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2700	3000	3400	3000	3000	4000	4000	4000	4000	4000	4000	4000	4000	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	4.6	3.6	2.8	4.2	3.4	0.7	0.7	0.6	0.5	0.5	0.4	0.2	0.2	0.2	0.2
		in.lb	41	32	25	37	30	6.2	6.2	5.3	4.4	4.4	3.5	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	12	13	16	16	16	13	13	13	13	13	13	13	16	16	16
		in.lb/ arcmin	106	115	142	142	142	115	115	115	115	115	115	115	142	142	142
Max. axial force [e]	F_{2AMax}	N	5700														
		lb_f	1283														
Max. radial force [e]	F_{2RMax}	N	6300														
		lb_f	1418														
Max. tilting moment	M_{2KMax}	Nm	833														
		in.lb	7370														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standardadapter plate	m	kg	8.9					10.6									
		lb_m	20					23									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive)																	
Clamping hub diameter [mm]	E	19	J_1	kgcm²	–	–	–	–	–	1.08	1.01	0.88	0.85	0.76	0.75	0.70	0.69	0.69	0.68
				10^{-3} in.lb.s²						0.96	0.89	0.78	0.75	0.67	0.66	0.62	0.66	0.61	0.60
	G	24	J_1	kgcm²	–	–	–	–	–	2.65	2.57	2.44	2.42	2.32	2.31	2.26	2.25	2.25	2.25
				10^{-3} in.lb.s²						2.34	2.28	2.16	2.14	2.06	2.05	2.00	2.00	1.99	1.99
	H	28	J_1	kgcm²	5.50	4.30	3.60	3.10	2.90	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	4.83	3.77	3.22	2.77	2.54										
	K	38	J_1	kgcm²	12.7	11.5	10.9	10.4	10.1	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	11.2	10.2	9.63	9.19	8.95										

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

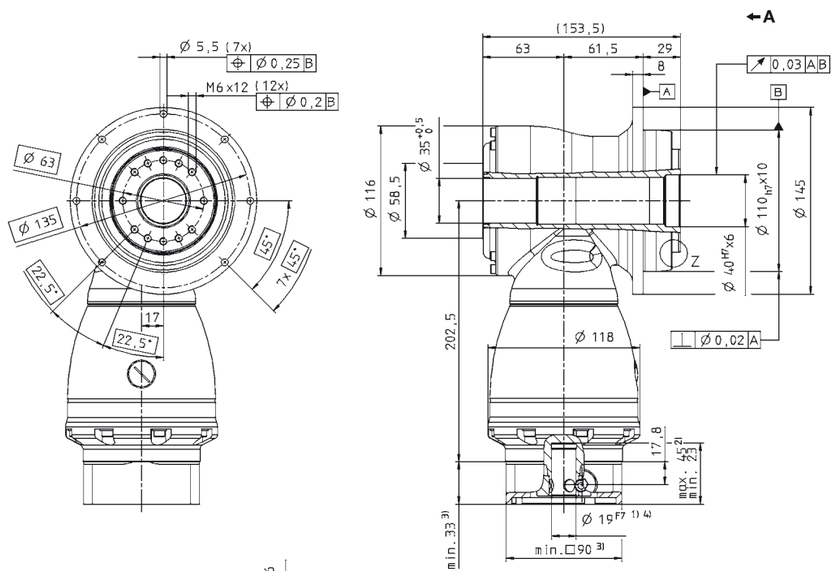
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:



2-stage:



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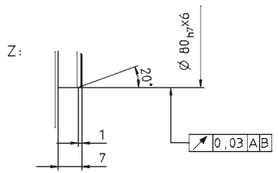


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TK+ 050 1/2-stage

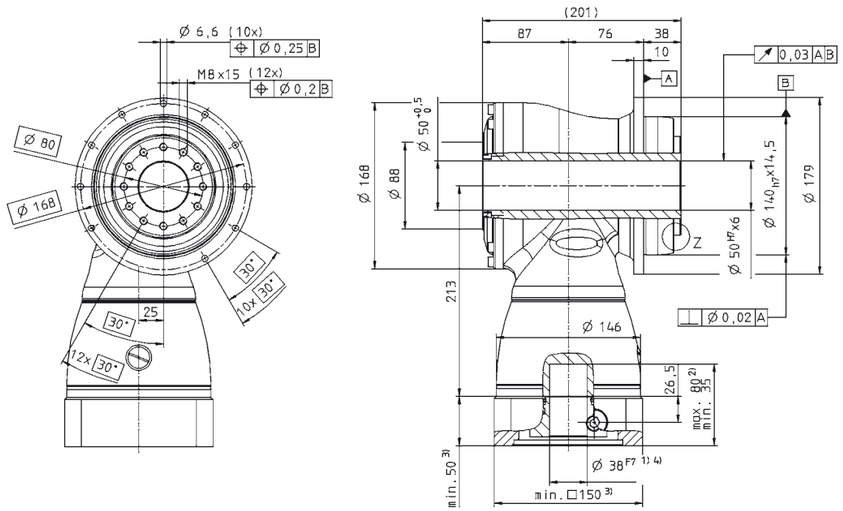
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	300	300	300	250	210	300	300	300	300	300	300	300	300	250	210
		in.lb	2655	2655	2655	2213	1859	2655	2655	2655	2655	2655	2655	2655	2655	2213	1859
Nominal output torque (with n_{1N})	T_{2N}	Nm	190	190	190	175	160	190	190	190	190	190	190	190	190	175	160
		in.lb	1682	1682	1682	1549	1416	1682	1682	1682	1682	1682	1682	1682	1682	1549	1416
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	400	500	500	450	400	500	500	500	500	500	500	500	500	450	400
		in.lb	3540	4425	4425	3983	3540	4425	4425	4425	4425	4425	4425	4425	4425	3983	3540
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	1700	1800	2000	1800	1800	2900	2900	2900	2900	2900	2900	2900	3200	3200	3900
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2200	2500	2800	2500	2500	4000	4000	4000	4000	4000	4000	4000	4200	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	8.4	6.2	5.4	9.0	6.6	1.7	1.1	0.8	0.6	0.6	0.5	0.5	0.4	0.4	0.4
		in.lb	74	55	48	80	58	15.0	9.7	7.1	5.3	5.3	4.4	4.4	3.5	3.5	3.5
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	36	40	46	44	42	40	40	40	40	40	40	40	46	44	42
		in.lb/ arcmin	315	356	405	387	376	356	356	356	356	356	356	356	405	387	376
Max. axial force [e)]	F_{2AMax}	N	9900														
		lb_f	2228														
Max. radial force [e)]	F_{2RMax}	N	9500														
		lb_f	2138														
Max. tilting moment	M_{2KMax}	Nm	1692														
		in.lb	14974														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standardadapter plate	m	kg	22					26									
		lb_m	49					57									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G 24	J_1	kgcm²	–	–	–	–	–	4.43	3.97	3.36	3.22	2.82	2.75	2.50	2.47	2.44	2.42
			10^{-3} in.lb.s²						3.92	3.51	2.97	2.85	2.50	2.44	2.22	2.18	2.16	2.14
	K 38	J_1	kgcm²	28.4	21.0	17.6	14.7	13.1	11.3	10.9	10.3	10.1	9.74	9.66	9.41	9.38	9.35	9.33
			10^{-3} in.lb.s²	25.1	18.6	15.5	13.0	11.6	10.0	9.63	9.09	8.96	8.62	8.55	8.33	8.30	8.28	8.26

[a)] Other ratios available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

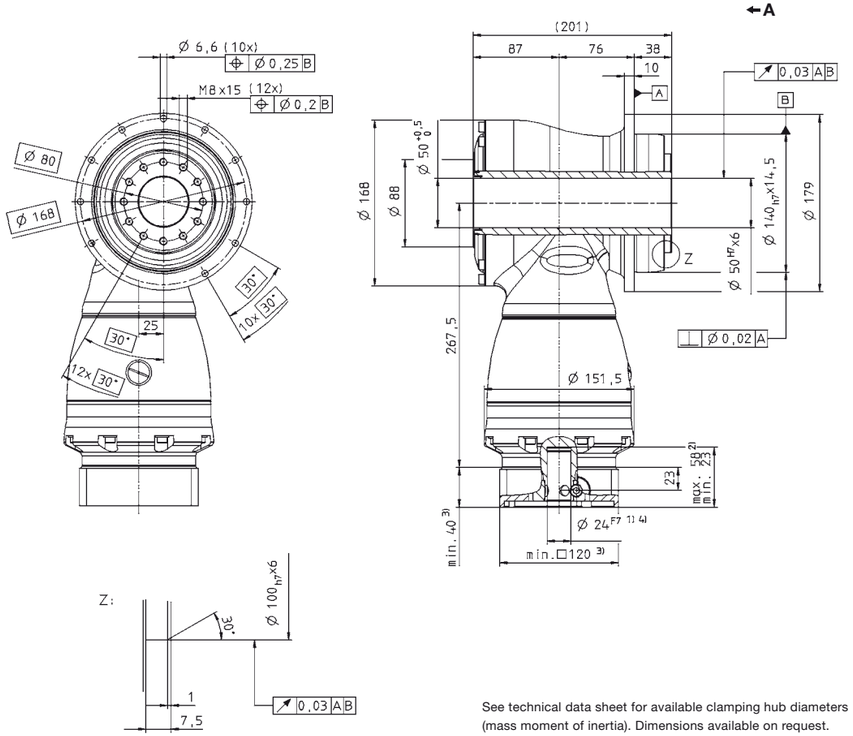
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:



2-stage:



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TK+ 110 1/2-stage

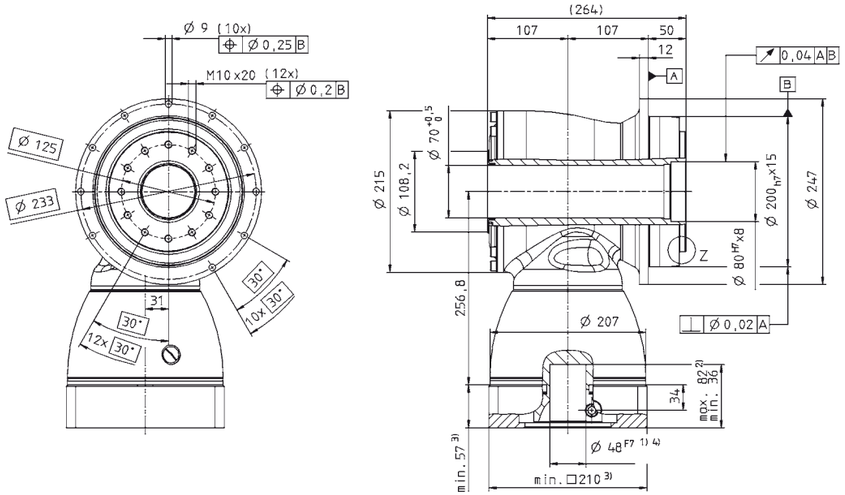
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	640	640	640	550	470	640	640	640	640	640	640	640	640	550	470
		in.lb	5664	5664	5664	4868	4160	5664	5664	5664	5664	5664	5664	5664	5664	4868	4160
Nominal output torque (with n_{1N})	T_{2N}	Nm	400	400	400	380	360	400	400	400	400	400	400	400	400	380	360
		in.lb	3540	3540	3540	3363	3186	3540	3540	3540	3540	3540	3540	3540	3540	3363	3186
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	900	1050	1050	970	900	1050	1050	1050	1050	1050	1050	1050	1050	970	900
		in.lb	7965	9293	9293	8585	7965	9293	9293	9293	9293	9293	9293	9293	9293	8585	7965
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	1400	1600	1800	1600	1600	2700	2700	2700	2700	2700	2700	2700	2900	3200	3400
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	1800	2100	2500	2200	2200	3500	3500	3500	3500	3500	3500	3500	3500	3800	3800
Max. input speed	n_{1Max}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	17.5	14.5	12.0	18.0	15.0	3.6	2.8	2.2	1.9	1.6	1.4	1.1	1.1	1.1	1.1
		in.lb	155	128	106	159	133	31.9	24.8	19.5	16.8	14.2	12.4	9.7	9.7	9.7	9.7
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	76	87	99	97	96	87	87	87	87	87	87	87	99	97	96
		in.lb/ arcmin	676	766	874	860	847	766	766	766	766	766	766	766	874	860	847
Max. axial force [e]	F_{2AMax}	N	14200														
		lb_f	3195														
Max. radial force [e]	F_{2RMax}	N	14700														
		lb_f	3308														
Max. tilting moment	M_{2KMax}	Nm	3213														
		in.lb	28435														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standardadapter plate	m	kg	48					54									
		lb_m	106					119									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive)	K	38	J_1	kgcm²	–	–	–	–	–	16.8	14.8	12.9	12.3	11.2	10.9	10.3	10.1	10.0	9.93
				10^{-3} in.lb.s²						14.8	13.1	11.4	10.9	9.88	9.63	9.08	8.95	8.84	8.79
Clamping hub diameter [mm]	M	48	J_1	kgcm²	96.5	64.6	50.5	38.2	31.8	31.5	29.5	27.6	27.0	25.9	25.6	25.0	24.8	24.7	24.6
				10^{-3} in.lb.s²	85.4	57.2	44.7	33.8	28.1	27.9	26.1	24.4	23.9	22.9	22.6	22.1	22.0	21.9	21.8

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

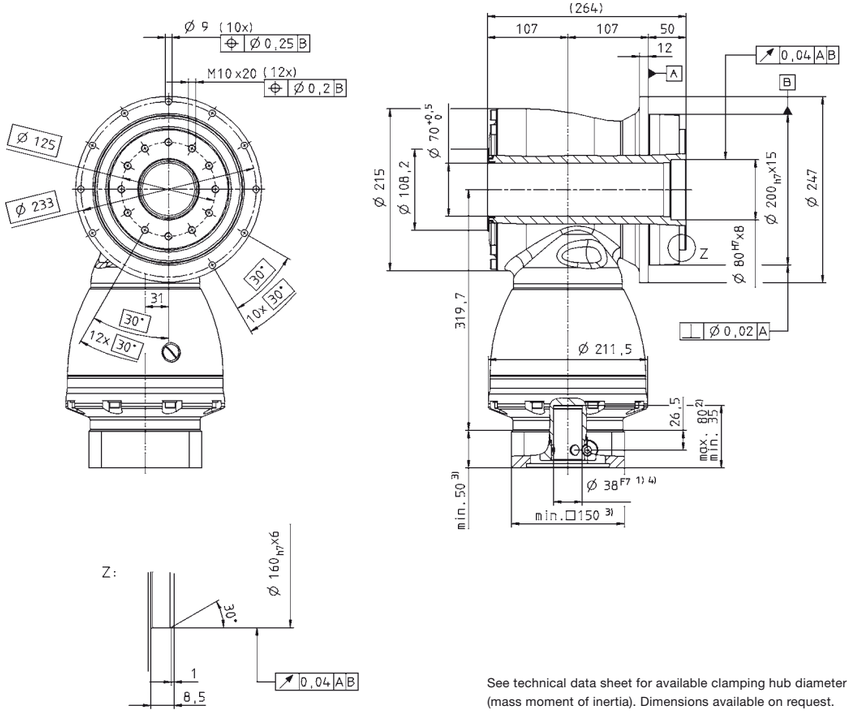
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:



2-stage:



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TPK+ 010 2-stage

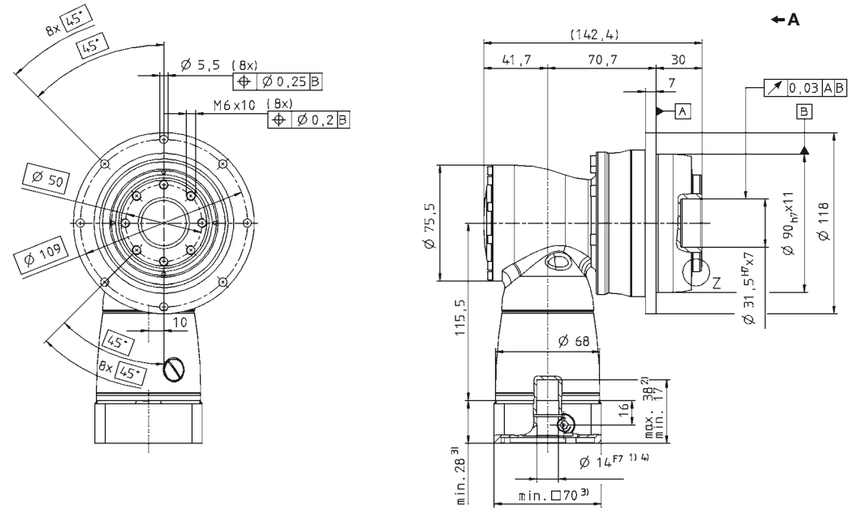
			2-stage										
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**49**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	120	120	130	130	130	130	80	130	100	130	100
		in.lb	1.062	1.062	1.151	1.151	1.151	1.151	708	1.151	885	1.151	885
Nominal output torque (with n_{1N})	T_{2N}	Nm	75	75	75	75	75	75	60	75	75	75	60
		in.lb	664	664	664	664	664	664	531	664	664	664	531
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	160	200	250	250	250	250	160	250	200	250	250
		in.lb	1416	1770	2213	2213	2213	2213	1416	2213	1770	2213	2213
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2000	2400	2400	2700	2400	2500	2500	2500	2500	2500	2500
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	3000	3400	3400	3800	3400	3200	3200	3200	3200	3200	3200
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	1.5	1.3	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3
		in.lb	13.3	11.5	10.6	10.6	10.6	11.5	11.5	11.5	11.5	11.5	11.5
Max. torsional backlash	j_t	arcmin	Standard ≤ 5 / Reduced ≤ 3										
Torsional rigidity	C_{t21}	Nm/ arcmin	16	16	20	21	23	24	15	23	19	22	27
		in.lb/ arcmin	142	142	177	186	204	212	133	204	168	195	239
Max. axial force [e)]	F_{2AMax}	N	2150										
		lb_f	484										
Max. tilting moment	M_{2KMax}	Nm	235										
		in.lb	2080										
Efficiency at full load	η	%	94										
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000										
Weight incl. standard adapter plate	m	kg	5.2										
		lb_m	11.5										
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Blue RAL 5002										
Direction of rotation			Motor and gearhead opposite directions										
Protection class			IP 65										
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C 14	J_1	kgcm²	0.55	0.46	0.44	0.39	0.43	0.36	0.34	0.37	0.34	0.34	0.34
			10^{-3} in.lb.s²	0.49	0.40	0.39	0.35	0.38	0.32	0.30	0.33	0.30	0.30	0.30
	E 19	J	kgcm²	0.90	0.81	0.79	0.75	0.78	0.71	0.70	0.72	0.70	0.69	0.69
			10^{-3} in.lb.s²	0.80	0.72	0.70	0.66	0.69	0.63	0.62	0.64	0.62	0.61	0.61

[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

2-stage:



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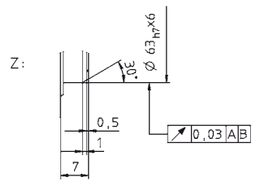


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TPK+ 010 3-stage

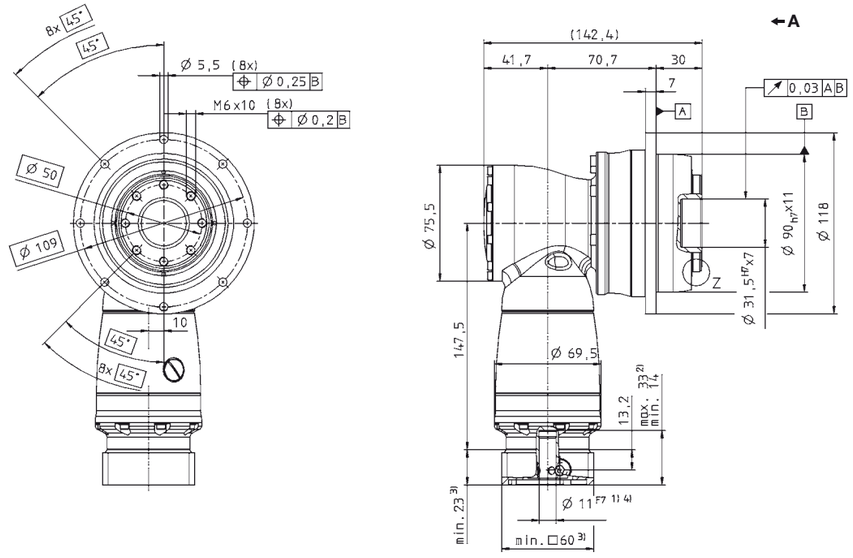
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	120	120	130	130	130	130	130	130	130	130	80	100	130	100
		in.lb	1062	1062	1151	1151	1151	1151	1151	1151	1151	1151	708	885	1151	885
Nominal output torque (with n_{1N})	T_{2N}	Nm	85	85	90	90	90	90	90	90	75	90	60	75	90	60
		in.lb	752	752	797	797	797	797	797	797	664	797	531	664	797	531
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	200	160	250	250	250	250	250	250	250	250	160	200	250	250
		in.lb	1770	1416	2213	2213	2213	2213	2213	2213	2213	2213	1416	1770	2213	2213
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	4400	4400	4400	4400	4400	4400	4400	4800	4400	4800	5500	5500	5500	5500
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	5000	5000	5000	5000	5000	5000	5000	5000	5000	5500	5500	5500	5500	5500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		in.lb	2.7	2.7	2.7	2.7	2.7	2.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin	Standard ≤ 5 / Reduced ≤ 3													
Torsional rigidity	C_{t21}	Nm/ arcmin	16	16	20	21	20	21	20	21	23	24	15	19	22	27
		in.lb/ arcmin	142	142	177	186	177	186	177	186	204	212	133	168	195	239
Max. axial force [e]	F_{2AMax}	N	2150													
		lb_f	484													
Max. tilting moment	M_{2KMax}	Nm	235													
		in.lb	2080													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standard adapter plate	m	kg	5,5													
		lb_m	12,2													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66													
Max. permitted housing temperature		°C	90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) **Clamping hub diameter [mm]**	B 11	J_1	kgcm²	0.09	0.07	0.08	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
			10^{-3} in.lb.s²	0.08	0.06	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	C 14	J	kgcm²	0.20	0.18	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
			10^{-3} in.lb.s²	0.18	0.16	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

3-stage:



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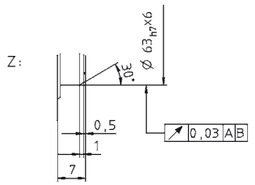


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TPK+ 025 2-stage

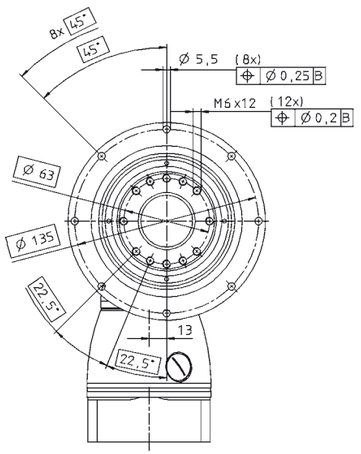
			2-stage										
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**49**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	280	280	350	350	350	330	330	330	265	400	400
		in.lb	2478	2478	3098	3098	3098	2921	1770	2921	2213	2921	2345
Nominal output torque (with n_{1N})	T_{2N}	Nm	170	170	170	170	170	170	160	170	170	170	120
		in.lb	1505	1505	1505	1505	1505	1505	1416	1505	1505	1505	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	400	575	575	500	625	625	400	625	500	625	625
		in.lb	3540	5089	5089	5089	5531	5531	3540	5531	4425	5531	5531
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2000	2400	2400	2700	2400	2500	2500	2500	2500	2500	2500
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	3000	3400	3400	3800	3400	3200	3200	3200	3200	3200	3200
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	2.5	2.1	2.0	1.8	2.0	1.8	2.0	2.2	2.0	2.0	2.0
		in.lb	22.1	18.6	17.7	15.9	17.7	15.9	17.7	19.5	17.7	17.7	17.7
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2										
Torsional rigidity	C_{t21}	Nm/ arcmin	40	42	53	55	59	60	44	60	55	60	56
		in.lb/ arcmin	354	372	469	487	522	531	389	531	487	531	496
Max. axial force [e)]	F_{2AMax}	N	4150										
		lb_f	934										
Max. tilting moment	M_{2KMax}	Nm	413										
		in.lb	3655										
Efficiency at full load	η	%	94										
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000										
Weight incl. standard adapter plate	m	kg	9.0										
		lb_m	19.9										
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Blue RAL 5002										
Direction of rotation			Motor and gearhead opposite directions										
Protection class			IP 65										
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	E 19	J_1	kgcm²	1.43	1.18	1.16	1.04	1.14	0.94	0.89	0.95	0.89	0.89	0.89
			10^{-3} in.lb.s²	1.27	1.04	1.02	0.92	1.01	0.83	0.79	0.84	0.79	0.79	0.78
	H 28	J_1	kgcm²	2.85	2.59	2.57	2.45	2.56	2.40	2.31	2.37	2.30	2.30	2.30
			10^{-3} in.lb.s²	2.52	2.29	2.27	2.17	2.26	2.08	2.04	2.10	2.04	2.04	2.04

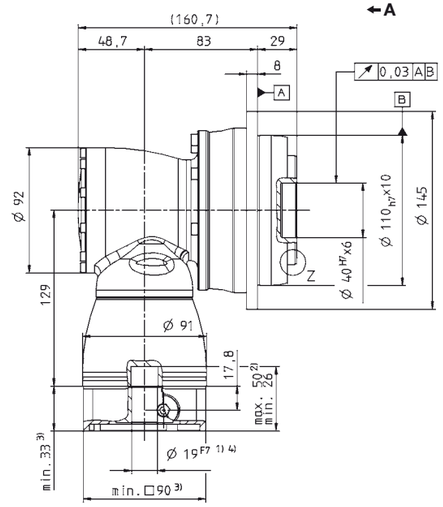
[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

2-stage:





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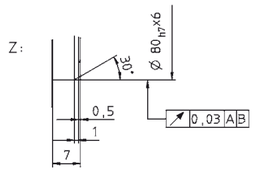


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TPK+ 025 3-stage

WITTENSTEIN

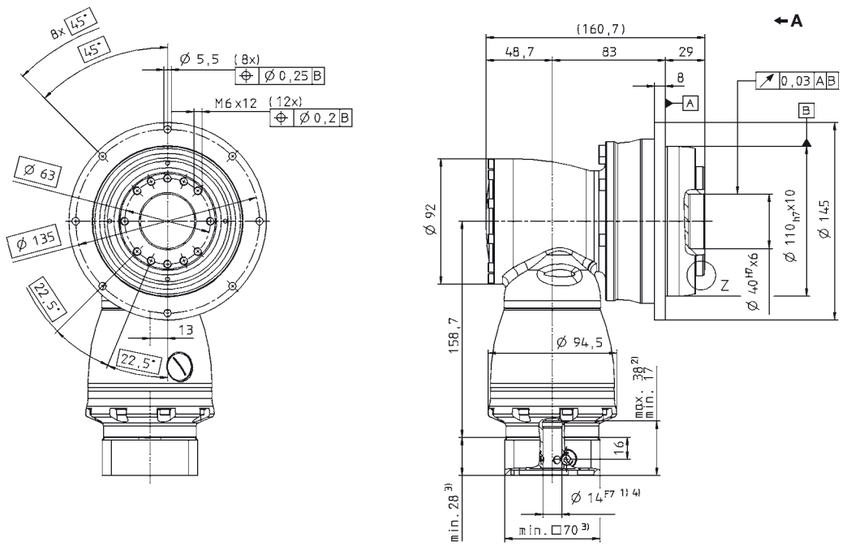
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	280	280	350	350	350	350	350	350	350	330	200	250	330	265
		in.lb	2478	2478	3098	3098	3098	3098	3098	3098	3098	2921	1770	2213	2921	2345
Nominal output torque (with n_{1N})	T_{2N}	Nm	200	170	200	200	200	200	200	200	210	200	160	200	200	120
		in.lb	1770	1505	1770	1770	1770	1770	1770	1770	1859	1770	1416	1770	1770	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	460	400	575	575	575	575	575	575	625	625	400	500	625	625
		in.lb	4071	3540	5089	5089	5089	5089	5089	5089	5531	5531	3540	4425	5531	5531
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	3500	3500	3500	3500	3500	3500	3500	3800	3500	3800	4500	4500	4500	4500
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		in.lb	3.5	2.7	2.7	2.7	2.7	2.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2													
Torsional rigidity	C_{t21}	Nm/ arcmin	42	40	53	55	53	55	53	55	59	60	44	55	60	56
		in.lb/ arcmin	372	354	469	487	469	487	469	487	522	531	389	487	531	496
Max. axial force [e]	F_{2AMax}	N	4150													
		lb_f	934													
Max. tilting moment	M_{2KMax}	Nm	413													
		in.lb	3655													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standard adapter plate	m	kg	9,8													
		lb_m	21,7													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68													
Max. permitted housing temperature		°C	90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C 14	J_1	kgcm²	0.28	0.23	0.24	0.23	0.21	0.20	0.19	0.18	0.19	0.18	0.18	0.18	0.18	0.18
			10^{-3} in.lb.s²	0.25	0.20	0.21	0.20	0.19	0.18	0.17	0.16	0.17	0.16	0.16	0.16	0.16	0.16
	E 19	J	kgcm²	0.72	0.63	0.68	0.68	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
			10^{-3} in.lb.s²	0.64	0.56	0.60	0.60	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

3-stage:



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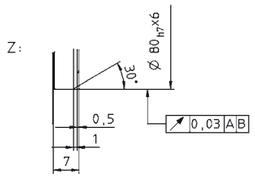


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TK+
TPK+

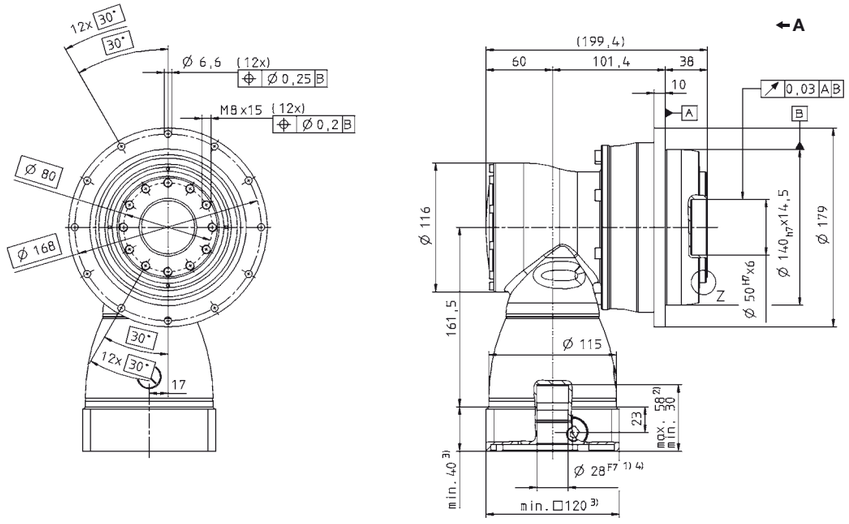
			2-stage										
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**49**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	680	680	750	750	700	700	500	700	625	700	540
		in.lb	6018	6018	6638	6638	6195	6416	4425	6195	5531	6195	4779
Nominal output torque (with n_{1N})	T_{2N}	Nm	370	370	370	370	370	370	320	370	370	370	240
		in.lb	3275	3275	3275	3275	3275	3275	2832	3275	3275	3275	2124
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1000	1000	1250	1250	1250	1250	1000	1250	1250	1250	1250
		in.lb	8850	8850	11063	11063	11063	11063	8850	11063	11063	11063	11063
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	1900	2300	2300	2600	2300	2300	2300	2300	2300	2300	2300
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2700	3100	3100	3500	3100	3000	3000	3000	3000	3000	3000
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	4.0	3.7	3.6	2.8	3.5	2.8	3.1	3.9	3.1	3.1	3.1
		in.lb	35.4	32.7	31.9	24.8	31.0	24.8	27.4	34.5	27.4	27.4	27.4
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2										
Torsional rigidity	C_{t21}	Nm/ arcmin	87	91	111	119	123	127	96	127	115	125	112
		in.lb/ arcmin	770	805	982	1053	1089	1124	850	1124	1018	1106	991
Max. axial force [e)]	F_{2AMax}	N	6130										
		lb_f	1379										
Max. tilting moment	M_{2KMax}	Nm	1295										
		in.lb	11461										
Efficiency at full load	η	%	94										
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000										
Weight incl. standard adapter platee	m	kg	17.0										
		lb_m	38										
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Blue RAL 5002										
Direction of rotation			Motor and gearhead opposite directions										
Protection class			IP 65										
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	H 28	J_1	kgcm²	4.56	3.76	3.71	3.28	3.66	3.00	2.79	3.10	2.78	2.77	2.77
			10^{-3} in.lb.s²	4.04	3.32	3.28	2.90	3.24	2.61	2.47	2.74	2.46	2.45	2.45
	K 38	J_1	kgcm²	11.7	10.9	10.9	10.4	10.8	10.3	9.95	10.4	9.94	9.94	9.93
			10^{-3} in.lb.s²	10.38	9.67	9.62	9.24	9.58	8.96	8.81	9.20	8.80	8.80	8.79

[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

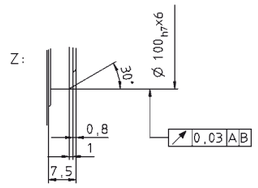
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

2-stage:



Z:



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TPK+ 050 3-stage

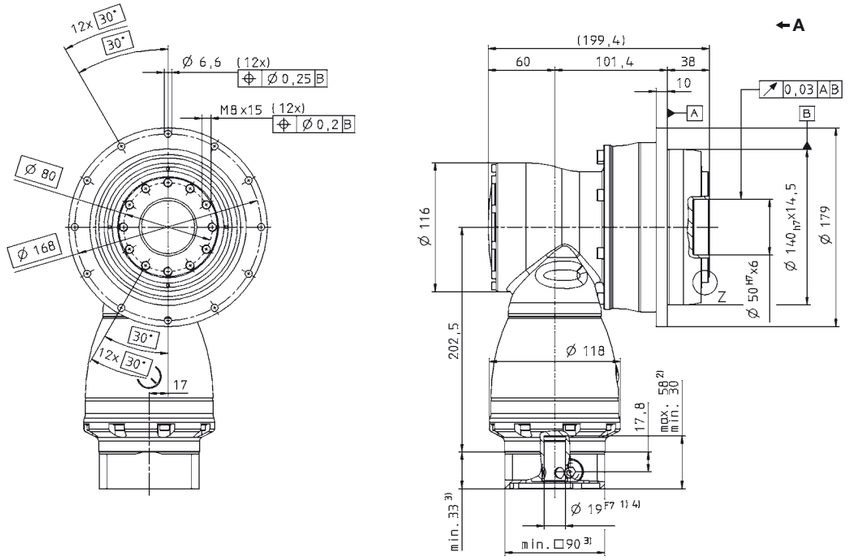
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	680	680	750	750	750	750	750	750	700	700	500	625	700	540
		in.lb	6018	6018	6638	6638	6638	6638	6638	6638	6195	6195	4425	5531	6195	4779
Nominal output torque (with n_{1N})	T_{2N}	Nm	400	400	400	400	400	400	400	400	400	400	320	370	400	240
		in.lb	3540	3540	3540	3540	3540	3540	3540	3540	3540	3540	2832	3275	3540	2124
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1000	1000	1250	1250	1250	1250	1250	1250	1250	1250	1000	1250	1250	1250
		in.lb	8850	8850	11063	11063	11063	11063	11063	11063	11063	11063	8850	11063	11063	11063
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	3100	3100	3100	3100	3100	3100	3100	3500	3100	3500	4200	4200	4200	4200
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4200	4200	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	0.7	0.4	0.6	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		in.lb	6.2	3.5	5.3	4.4	4.4	3.5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2													
Torsional rigidity	C_{t21}	Nm/ arcmin	91	87	111	119	111	119	111	119	123	127	95	115	125	112
		in.lb/ arcmin	805	770	982	1053	982	1053	982	1053	1089	1124	841	1018	1106	991
Max. axial force [e]	F_{2AMax}	N	6130													
		lb_f	1379													
Max. tilting moment	M_{2KMax}	Nm	1295													
		in.lb	11461													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standard adapter plate	m	kg	18,7													
		lb_m	41,3													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	< 68													
Max. permitted housing temperature		°C	90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	E 19	J_1	kgcm²	1.01	0.76	0.88	0.85	0.76	0.75	0.70	0.69	0.70	0.69	0.69	0.69	0.69	0.69
			10^{-3} in.lb.s²	0.89	0.67	0.78	0.75	0.67	0.66	0.62	0.61	0.62	0.61	0.61	0.61	0.61	0.61
	G 24	J	kgcm²	2.57	2.32	2.44	2.42	2.32	2.31	2.26	2.25	2.26	2.25	2.25	2.25	2.25	2.25
			10^{-3} in.lb.s²	2.27	2.05	2.16	2.14	2.05	2.04	2.00	1.99	2.00	1.99	1.99	1.99	1.99	1.99

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

3-stage:



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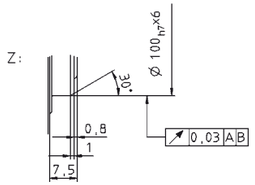


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TPK+ 110 2-stage

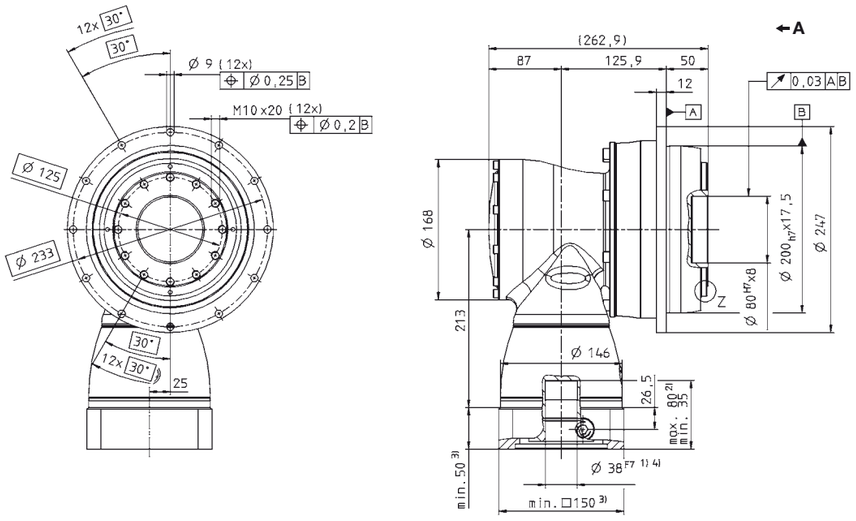
			2-stage										
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**49**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1200	1200	1500	1500	1600	1600	840	1600	1050	1470	1400
		in.lb	10620	10620	13275	13275	14160	14160	7434	14160	9293	13010	12390
Nominal output torque (with n_{1N})	T_{2N}	Nm	700	700	750	750	750	750	640	750	750	750	750
		in.lb	6195	6195	6638	6638	6638	6638	5664	6638	6638	6638	6638
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1600	2000	2500	2500	2750	2750	1600	2750	2000	2750	2750
		in.lb	14160	17700	22125	22125	24338	24338	14160	24338	17700	24338	24338
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	1600	1900	1900	2100	1900	2100	2100	2100	2100	2100	2100
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2300	2600	2600	2800	2600	3000	3000	3000	3000	3000	3000
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	9.0	6.5	6.5	5.5	6.0	6.0	6.0	8.0	6.0	6.0	6.0
		in.lb	79.7	57.5	57.5	48.7	53.1	53.1	53.1	70.8	53.1	53.1	53.1
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2										
Torsional rigidity	C_{t21}	Nm/ arcmin	253	269	336	346	400	407	274	410	341	404	389
		in.lb/ arcmin	2239	2381	2974	3062	3540	3602	2425	3629	3018	3575	3443
Max. axial force [e)]	F_{2AMax}	N	10050										
		lb_f	2261										
Max. tilting moment	M_{2KMax}	Nm	3064										
		in.lb	27116										
Efficiency at full load	η	%	94										
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000										
Weight incl. standard adapter plate	m	kg	41.0										
		lb_m	91										
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 70										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Blue RAL 5002										
Direction of rotation			Motor and gearhead opposite directions										
Protection class			IP 65										
Moment of inertia (relates to the drive) Clamping hub diameter [mm] K 38	J_1	kgcm²	24.3	19.0	18.7	16.1	18.5	15.7	12.8	17.5	12.7	12.7	12.7
		10^{-3} in.lb.s²	21.5	16.8	16.6	14.2	16.4	12.3	11.3	15.5	11.3	11.2	11.2

[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

2-stage:



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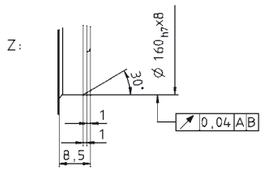


See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

TPK+ 110 3-stage

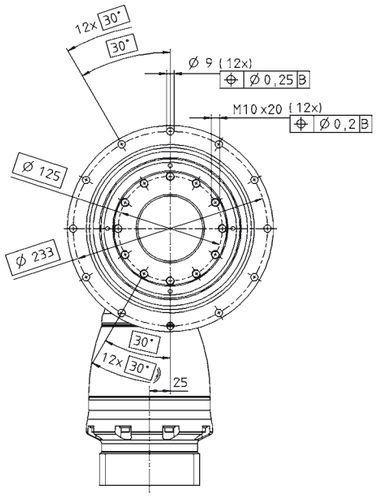
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1200	1200	1500	1500	1500	1500	1500	1500	1600	1600	840	1050	1470	1400
		in.lb	10620	10620	13275	13275	13275	13275	13275	13275	14160	14160	7434	9293	13010	12390
Nominal output torque (with n_{1N})	T_{2N}	Nm	700	700	950	950	950	950	950	950	1120	1250	640	750	1120	800
		in.lb	6195	6195	8408	8408	8408	8408	8408	8408	9912	11063	5664	6638	9912	7080
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1600	1600	2500	2500	2500	2500	2500	2500	2750	2750	1600	2000	2750	2750
		in.lb	14160	14160	22125	22125	22125	22125	22125	22125	24338	24338	14160	17700	24338	24338
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2900	2900	2900	2900	2900	2900	2900	3200	2900	3200	3900	3900	3900	3900
Max. continuous speed (with 20 % T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4200	4200	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	1	0.5	0.8	0.6	0.6	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4
		in.lb	8.9	4.4	7.1	5.3	5.3	4.4	4.4	3.5	4.4	3.5	3.5	3.5	3.5	3.5
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2													
Torsional rigidity	C_{t21}	Nm/ arcmin	269	252	336	346	336	346	336	346	400	407	274	341	404	389
		in.lb/ arcmin	2381	2230	2974	3062	2974	3062	2974	3062	3540	3602	2425	3018	3575	3443
Max. axial force [e)]	F_{2AMax}	N	10050													
		lb_f	2261													
Max. tilting moment	M_{2KMax}	Nm	3064													
		in.lb	27116													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standard adapter plate	m	kg	45,4													
		lb_m	100,3													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	< 70													
Max. permitted housing temperature		°C	90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G 24	J_1	kgcm²	3.97	2.82	3.36	3.22	2.82	2.75	2.50	2.47	2.50	2.44	2.42	2.42	2.42	2.42
			10^{-3} in.lb.s²	3.51	2.50	2.97	2.85	2.50	2.43	2.21	2.19	2.21	2.16	2.14	2.14	2.14	2.14
	K 38	J	kgcm²	10.90	9.74	10.30	10.10	9.74	9.66	9.41	9.38	9.41	9.38	9.33	9.33	9.33	9.33
			10^{-3} in.lb.s²	9.65	8.62	9.12	8.94	8.62	8.55	8.33	8.30	8.33	8.30	8.26	8.26	8.26	8.26

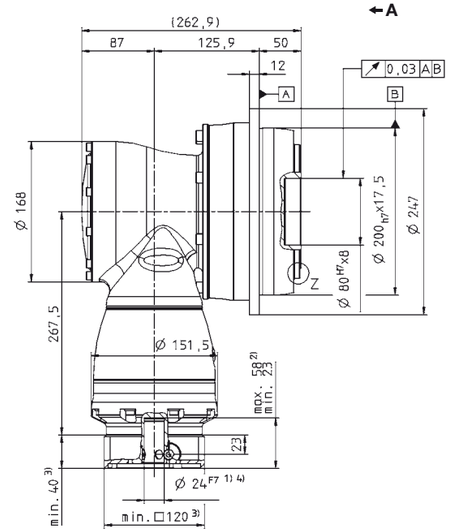
[a)] Other ratios available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

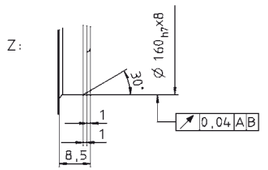
View A

3-stage:





Z:



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SK⁺/SPK⁺ – New right-angle precision

The successor to our versatile hypoid gearhead with SP⁺ compatible output shaft, also available with planetary stage

See our website and our separate flyer for more information about our washdown solutions

Shrink disc

Couplings

Rack / Pinion

SK⁺/SPK⁺

Specifications \ Version	SK⁺/SPK⁺		
	+	++	+++
Positioning accuracy		SK⁺	
		SPK⁺	
Rigidity	SK⁺		
		SPK⁺	
Smooth-running		SK⁺	
		SPK⁺	
Speed capacity		SK⁺	
		SPK⁺	
Power density	SK⁺		
		SPK⁺	
Max. axial/radial forces		SK⁺	
		SPK⁺	

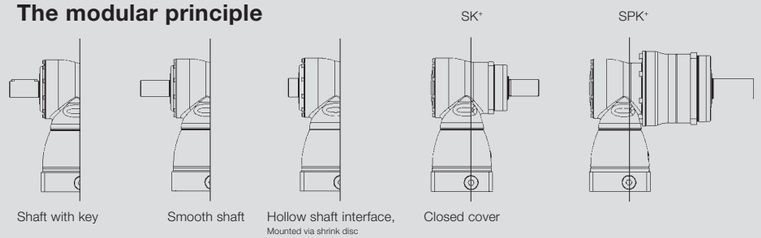
Options

Plug-in drive coupling
Smooth ourput shaft / with key / involute
Washdown version
ATEX version
Food-grade grease

Accessories

Rack / Pinion (see page 236)
Shrink disc (see page 202)
Couplings (see page 268)

The modular principle



SK+ 060 1/2-stage

			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	30	30	30	25	20	30	30	30	30	30	30	30	30	25	20
		in.lb	266	266	266	221	177	266	266	266	266	266	266	266	266	221	177
Nominal output torque (with n_{2N})	T_{2N}	Nm	22	22	22	20	15	22	22	22	22	22	22	22	22	20	15
		in.lb	195	195	195	177	133	195	195	195	195	195	195	195	195	177	133
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	40	50	50	45	40	50	50	50	50	50	50	50	50	45	40
		in.lb	354	443	443	398	354	443	443	443	443	443	443	443	443	398	354
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	2500	2700	3000	3000	3000	4400	4400	4400	4400	4400	4400	4400	4800	5500	5500
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	3000	3500	4000	3500	3500	5000	5000	5000	5000	5000	5000	5000	5000	5500	5500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	1.2	1.1	1.0	1.2	1.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
		in.lb	10.6	9.7	8.9	10.6	9.7	1.8	1.8	1.8	1.8	1.8	1.8	0.9	0.9	0.9	0.9
Max. torsional backlash	j_t	arcmin	≤ 5														
Torsional rigidity	C_{t21}	Nm/ arcmin	2.0	2.1	2.2	2.0	1.8	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.0	1.8
		in.lb/ arcmin	18	19	19	18	16	19	19	19	19	19	19	19	19	18	16
Max. axial force [e]	F_{2AMax}	N	2400														
		lb_f	540														
Max. radial force [e]	F_{2RMax}	N	2700														
		lb_f	608														
Max. tilting moment	M_{2KMax}	Nm	251														
		in.lb	2220														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standard adapter plate	m	kg	2.9					3.2									
		lb_m	6.4					7.1									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 64														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	B	11	J_1	kgcm²	–	–	–	–	–	0.09	0.09	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06
				10^{-3} in.lb.s²						0.08	0.08	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05
	C	14	J_1	kgcm²	0.52	0.44	0.40	0.36	0.34	0.20	0.20	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.17
				10^{-3} in.lb.s²	0.46	0.39	0.35	0.32	0.30	0.18	0.18	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15
	E	19	J_1	kgcm²	0.87	0.79	0.75	0.71	0.70	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	0.77	0.70	0.66	0.63	0.62										

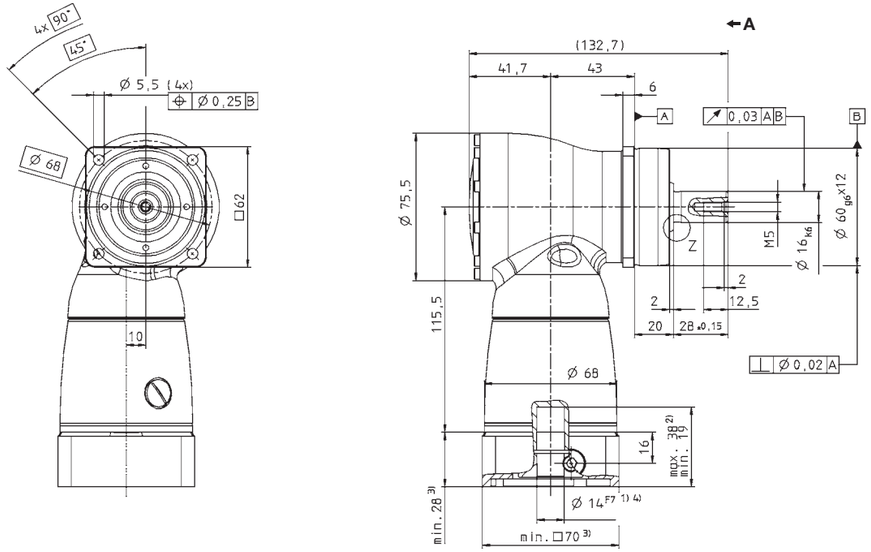
[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

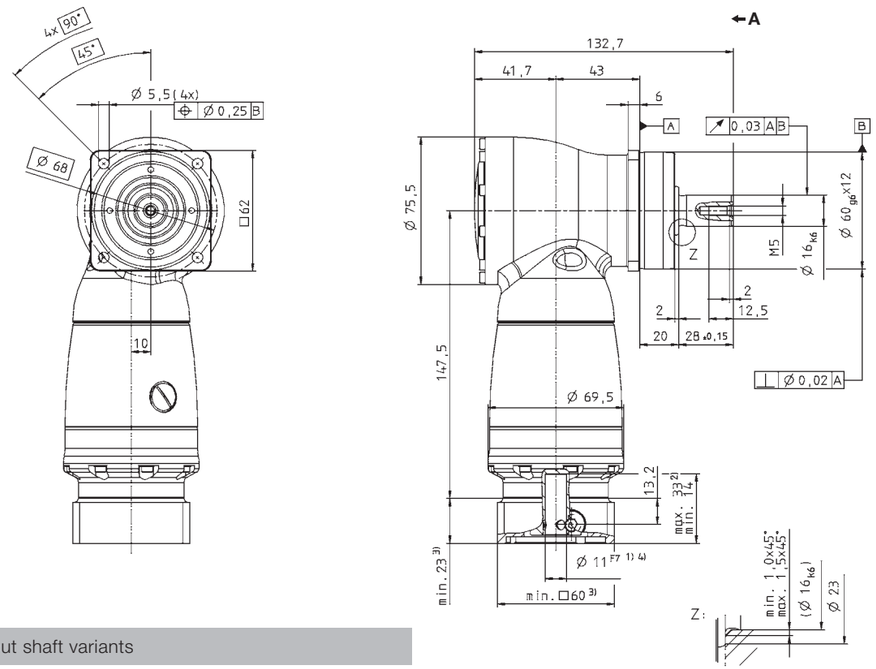
WITTENSTEIN

View A

1-stage:

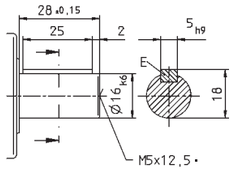


2-stage:

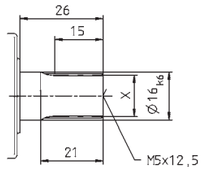


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480
X = W 16 x 0,8 x 30 x 18 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SK+ 075 1/2-stage

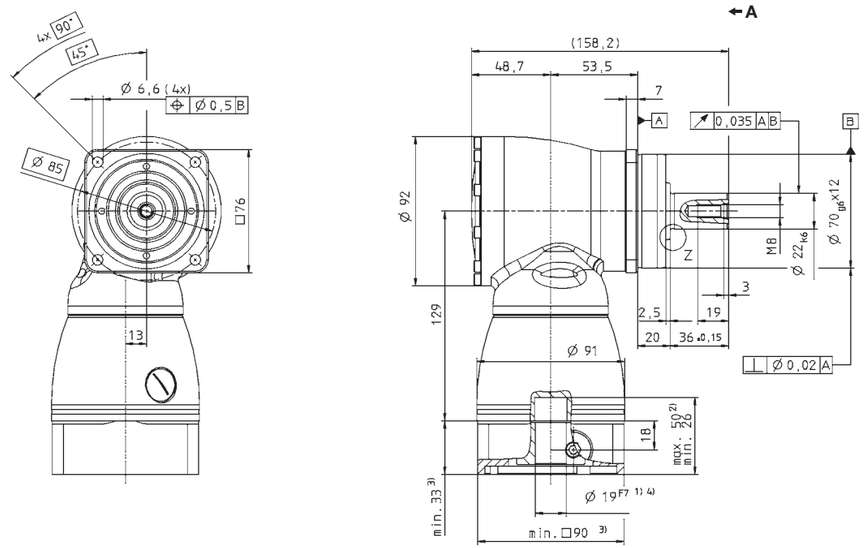
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	70	70	70	60	50	70	70	70	70	70	70	70	70	60	50
		in.lb	620	620	620	531	443	620	620	620	620	620	620	620	620	531	443
Nominal output torque (with n_{1N})	T_{2N}	Nm	50	50	50	45	40	50	50	50	50	50	50	50	50	45	40
		in.lb	443	443	443	398	354	443	443	443	443	443	443	443	443	398	354
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	95	115	115	110	100	115	115	115	115	115	115	115	115	110	100
		in.lb	841	1018	1018	974	885	1018	1018	1018	1018	1018	1018	1018	1018	974	885
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2300	2500	2800	2800	2800	3500	3500	3500	3500	3500	3500	3500	3800	4500	4500
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	3000	3500	4000	3500	3500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	2.0	1.7	1.5	2.0	1.8	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
		in.lb	18	15	13	18	16	2.7	2.7	1.8	1.8	1.8	1.8	0.9	0.9	0.9	0.9
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	5.0	5.5	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	6.0	6.0	6.0
		in.lb/ arcmin	44	49	53	53	53	49	49	49	49	49	49	49	53	53	53
Max. axial force [e)]	F_{2AMax}	N	3400														
		lb_f	765														
Max. radial force [e)]	F_{2RMax}	N	4000														
		lb_f	900														
Max. tilting moment	M_{2KMax}	Nm	437														
		in.lb	3867														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standard adapter plate	m	kg	4.8					5.4									
		lb_m	10.6					11.9									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C 14	J_1	kgcm²	–	–	–	–	–	0.28	0.27	0.23	0.23	0.20	0.20	0.18	0.18	0.18	0.18
			10^{-3} in.lb.s²						0.25	0.24	0.21	0.20	0.18	0.18	0.16	0.16	0.16	0.16
	E 19	J_1	kgcm²	1.46	1.19	1.06	0.95	0.90	0.73	0.71	0.68	0.67	0.63	0.62	0.63	0.63	0.63	0.63
			10^{-3} in.lb.s²	1.29	1.05	0.94	0.84	0.79	0.64	0.63	0.60	0.59	0.55	0.55	0.56	0.55	0.55	0.55
	H 28	J_1	kgcm²	2.88	2.61	2.47	2.37	2.31	–	–	–	–	–	–	–	–	–	–
			10^{-3} in.lb.s²	2.55	2.31	2.19	2.10	2.04										

[a)] Other ratios available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

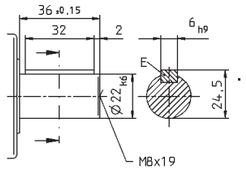
1-stage:



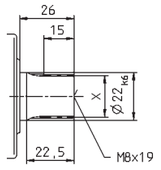
2-stage:

Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 16 x 6m



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SK+ 100 1/2-stage

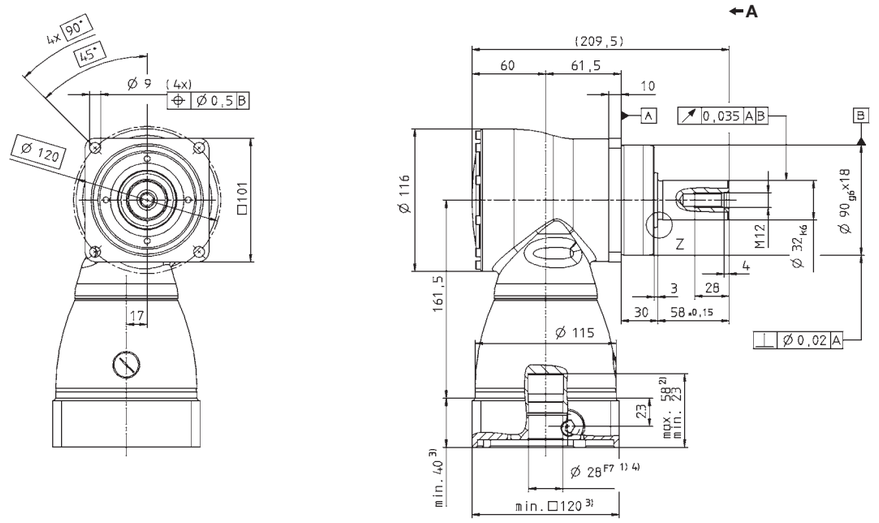
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	170	170	170	145	125	170	170	170	170	170	170	170	170	145	125
		in.lb	1505	1505	1505	1283	1106	1505	1505	1505	1505	1505	1505	1505	1505	1283	1106
Nominal output torque (with n_{2N})	T_{2N}	Nm	100	100	100	90	80	100	100	100	100	100	100	100	100	90	80
		in.lb	885	885	885	797	708	885	885	885	885	885	885	885	885	797	708
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	220	260	260	255	250	260	260	260	260	260	260	260	260	255	250
		in.lb	1947	2301	2301	2257	2213	2301	2301	2301	2301	2301	2301	2301	2301	2257	2213
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2200	2400	2700	2500	2500	3100	3100	3100	3100	3100	3100	3100	3500	4200	4200
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	3000	3400	3800	3400	3400	4000	4000	4000	4000	4000	4000	4000	4000	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	3.8	3.0	2.3	3.5	2.8	0.6	0.6	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.2
		in.lb	34	27	20	31	25	5.3	5.3	4.4	3.5	3.5	2.7	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	10	11	13	13	13	11	11	11	11	11	11	11	13	13	13
		in.lb/ arcmin	89	97	115	115	115	97	97	97	97	97	97	97	115	115	115
Max. axial force [e)]	F_{2AMax}	N	5700														
		lb_f	1283														
Max. radial force [e)]	F_{2RMax}	N	6300														
		lb_f	1418														
Max. tilting moment	M_{2KMax}	Nm	833														
		in.lb	7370														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standardadapter plate	m	kg	9.3					10.0									
		lb_m	21					22									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	E 19	J_1	kgcm²	–	–	–	–	–	1.02	0.97	0.86	0.84	0.75	0.74	0.69	0.69	0.68	0.68
			10^{-3} in.lb.s²						0.91	0.86	0.76	0.74	0.66	0.66	0.61	0.61	0.60	0.60
	G 24	J_1	kgcm²	–	–	–	–	–	2.59	2.54	2.42	2.40	2.31	2.30	2.26	2.25	2.25	2.25
			10^{-3} in.lb.s²						2.29	2.25	2.14	2.13	2.05	2.04	2.00	1.99	1.99	1.99
	H 28	J_1	kgcm²	4.64	3.80	3.34	2.98	2.79	–	–	–	–	–	–	–	–	–	–
			10^{-3} in.lb.s²	4.10	3.36	2.95	2.64	2.47										
	K 38	J_1	kgcm²	11.9	11.0	10.6	10.2	10.0	–	–	–	–	–	–	–	–	–	–
			10^{-3} in.lb.s²	10.5	9.77	9.37	9.05	8.89										

[a)] Other ratios available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

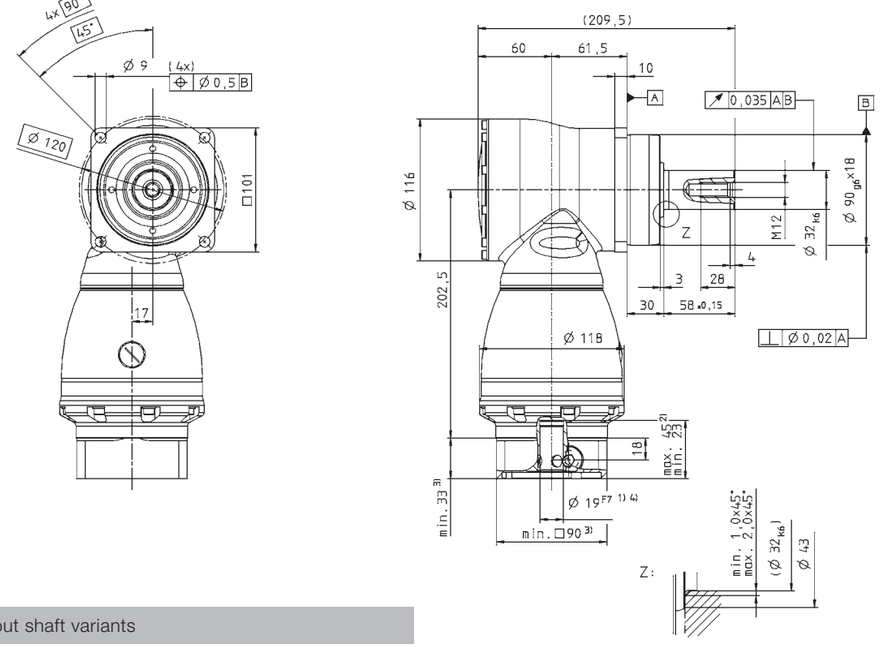
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:

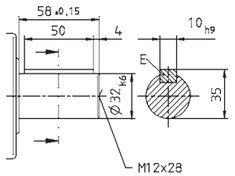


2-stage:

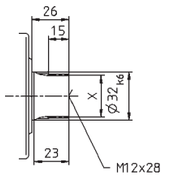


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480
X = W 32 x 1.25 x 30 x 24 x 6m



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SK+ 140 1/2-stage

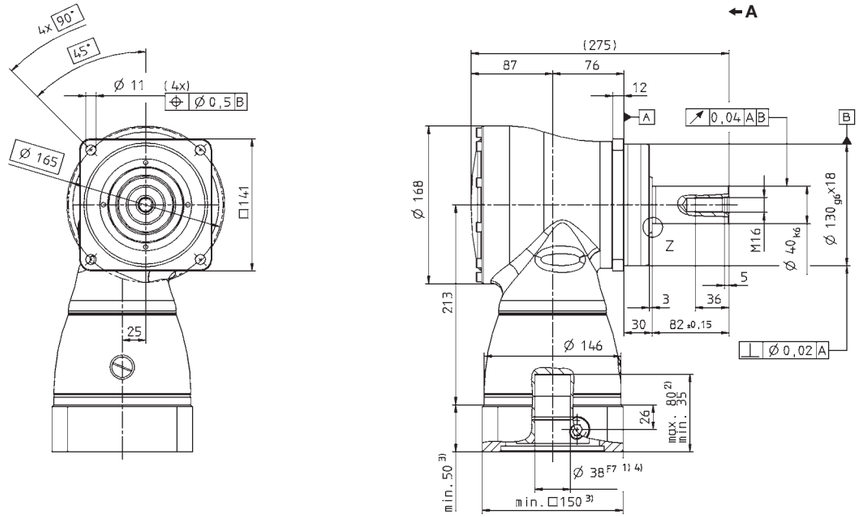
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	300	300	300	250	210	300	300	300	300	300	300	300	300	250	210
		in.lb	2655	2655	2655	2213	1859	2655	2655	2655	2655	2655	2655	2655	2655	2213	1859
Nominal output torque (with n_{2N})	T_{2N}	Nm	190	190	190	175	160	190	190	190	190	190	190	190	190	175	160
		in.lb	1682	1682	1682	1549	1416	1682	1682	1682	1682	1682	1682	1682	1682	1549	1419
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	400	500	500	450	400	500	500	500	500	500	500	500	500	450	400
		in.lb	3540	4425	4425	3983	3540	4425	4425	4425	4425	4425	4425	4425	4425	3983	3540
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	1900	2000	2200	2000	2000	2900	2900	2900	2900	2900	2900	2900	3200	3200	3900
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2500	2800	3100	2800	2800	4000	4000	4000	4000	4000	4000	4000	4200	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	7.0	5.2	4.5	7.5	5.5	1.4	0.9	0.7	0.5	0.5	0.4	0.4	0.3	0.3	0.3
		in.lb	62	46	40	66	49	12.4	8	6.2	4.4	4.4	3.5	3.5	2.7	2.7	2.7
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	27	30	32	32	32	29	29	29	29	29	29	29	31	31	31
		in.lb/ arcmin	239	266	283	283	283	257	257	257	257	257	257	257	274	274	274
Max. axial force [e]	F_{2AMax}	N	9900														
		lb_f	2228														
Max. radial force [e]	F_{2RMax}	N	9500														
		lb_f	2138														
Max. tilting moment	M_{2KMax}	Nm	1692														
		in.lb	14974														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standardadapter plate	m	kg	22.6					25.0									
		lb_m	50					55									
Operating noise (with n_1 = 3000 rpm without load)	L_{PA}	dB(A)	≤ 68														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive)	G	24	J_1	kgcm²	–	–	–	–	–	4.21	3.85	3.28	3.17	2.78	2.73	2.48	2.46	2.43	2.42
				10^{-3} in.lb.s²						3.73	3.41	2.90	2.80	2.46	2.41	2.20	2.17	2.15	2.14
Clamping hub diameter [mm]	K	38	J_1	kgcm²	25.0	19.1	16.3	14.1	12.8	11.1	10.7	10.2	10.1	9.69	9.64	9.39	9.37	9.34	9.33
				10^{-3} in.lb.s²	22.1	16.9	14.4	12.4	11.3	9.83	9.51	9.01	8.92	8.58	8.53	8.31	8.29	8.27	8.26

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

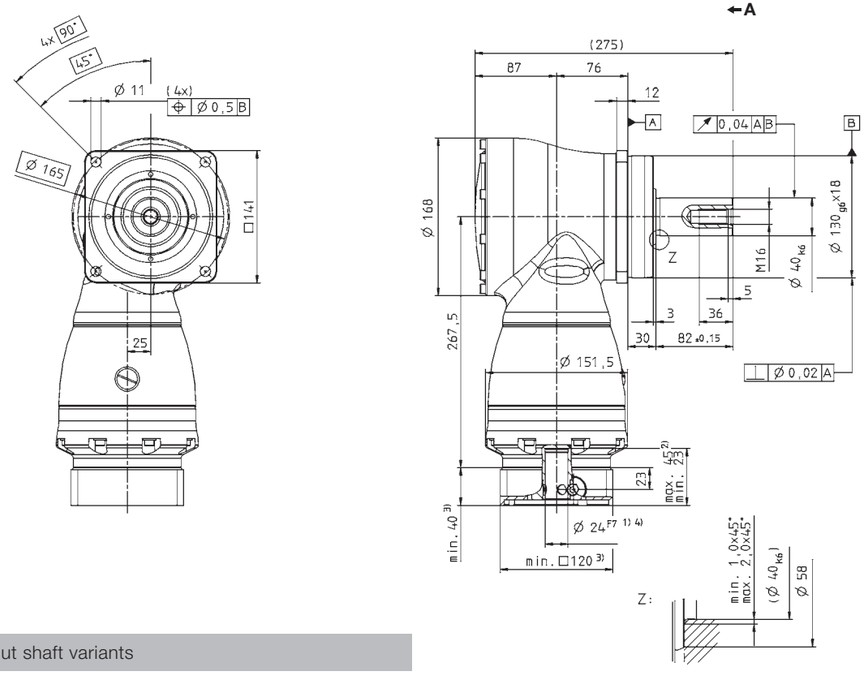
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:

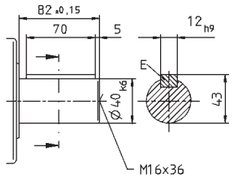


2-stage:

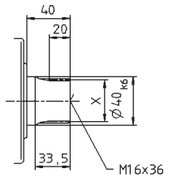


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480
X = W 40 x 2 x 30 x 18 x 6m



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual

SK+ 180 1/2-stage

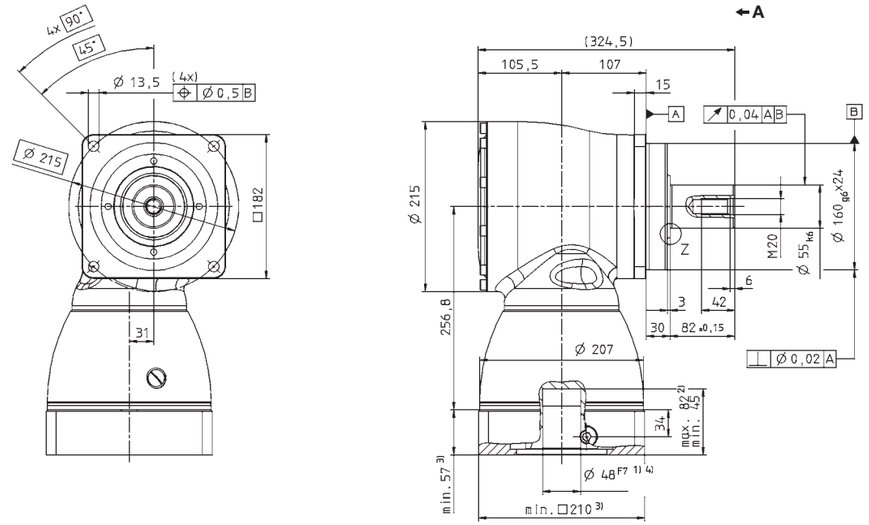
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	640	640	640	550	470	640	640	640	640	640	640	640	640	550	470
		in.lb	5664	5664	5664	4868	4160	5664	5664	5664	5664	5664	5664	5664	5664	4868	4160
Nominal output torque (with n_{2N})	T_{2N}	Nm	400	400	400	380	360	400	400	400	400	400	400	400	400	380	360
		in.lb	3540	3540	3540	3363	3186	3540	3540	3540	3540	3540	3540	3540	3540	3363	3186
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	900	1050	1050	970	900	1050	1050	1050	1050	1050	1050	1050	1050	970	900
		in.lb	7965	9293	9293	8585	7965	9293	9293	9293	9293	9293	9293	9293	9293	8585	7965
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	1600	1800	2000	1800	1800	2700	2700	2700	2700	2700	2700	2700	2900	3200	3400
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2000	2400	2800	2500	2500	3500	3500	3500	3500	3500	3500	3500	3500	3800	3800
Max. input speed	n_{1Max}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	14.5	12.0	10.0	15.0	12.5	3.0	2.3	1.8	1.6	1.3	1.2	0.9	0.9	0.9	0.9
		in.lb	128	106	89	133	111	26.6	20.4	15.9	14.2	11.5	10.6	8.0	8.0	8.0	8.0
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	64	71	79	78	77	71	71	71	71	71	71	71	78	78	78
		in.lb/ arcmin	566	628	699	690	681	628	628	628	628	628	628	628	690	690	690
Max. axial force [e]	F_{2AMax}	N	14200														
		lb_f	3195														
Max. radial force [e]	F_{2RMax}	N	14700														
		lb_f	3308														
Max. tilting moment	M_{2KMax}	Nm	3213														
		in.lb	28435														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standardadapter plate	m	kg	45.4					48									
		lb_m	100					106									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	K 38	J_1 kgcm²	–	–	–	–	–	15.3	14.0	12.3	12.0	10.9	10.7	10.1	10.0	9.95	9.91
		10^{-3} in.lb.s²						13.6	12.3	10.9	10.6	9.65	9.48	8.96	8.88	8.81	8.77
	M 48	J_1 kgcm²	73.3	51.6	42.1	34.0	29.7	30.0	28.7	27.1	26.7	25.6	25.4	24.8	24.7	24.7	24.6
		10^{-3} in.lb.s²	64.9	45.6	37.3	30.1	26.3	26.6	25.4	23.9	23.6	22.7	22.5	22.0	21.9	21.8	21.8

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

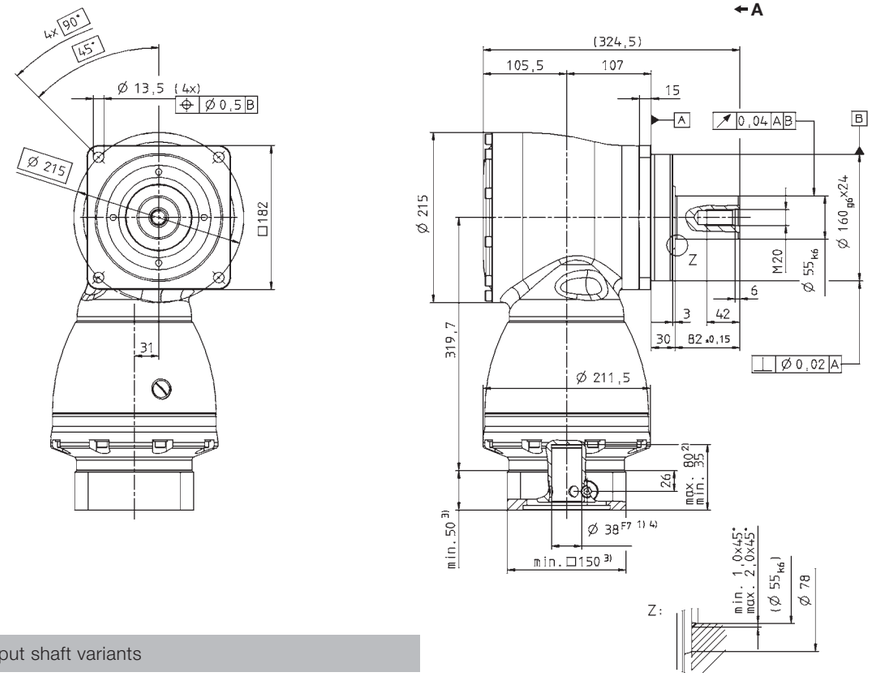
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

1-stage:

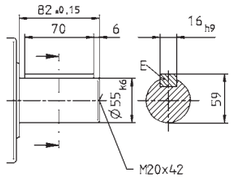


2-stage:

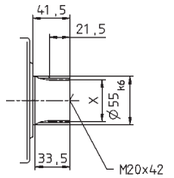


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480
X = W 55 x 2 x 30 x 26 x 6m



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual

SP180S

SPK+ 075 2-stage

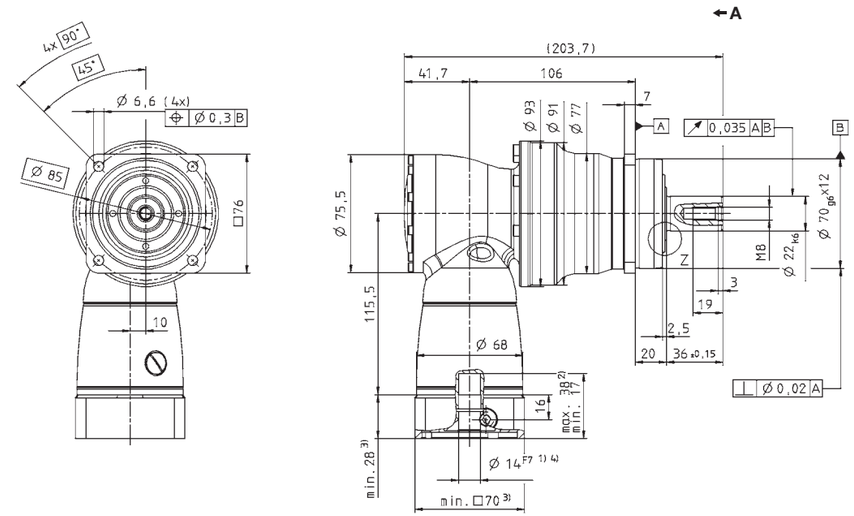
			2-stage									
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	110	110	110	110	110	110	80	100	110	90
		in.lb	974	974	974	974	974	974	974	885	974	797
Nominal output torque (with n_{2N})	T_{2N}	Nm	75	75	75	75	75	75	60	75	75	52
		in.lb	664	664	664	664	664	664	531	664	664	460
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	160	160	200	200	250	175	120	150	210	200
		in.lb	1416	1416	1770	1770	2213	1549	1062	1328	1859	1770
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2000	2400	2400	2700	2400	2500	2500	2500	2500	2500
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	3000	3400	3400	3800	3400	3200	3200	3200	3200	3200
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	1.5	1.3	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3
		in.lb	13.3	11.5	10.6	10.6	10.6	11.5	11.5	11.5	11.5	11.5
Max. torsional backlash	j_t	arcmin	Standard ≤ 5 / Reduced ≤ 3									
Torsional rigidity	C_{t21}	Nm/ arcmin	10									
		in.lb/ arcmin	89									
Max. axial force [e)]	F_{2AMax}	N	3350									
		lb_f	753									
Max. radial force [e)]	F_{2RMax}	N	4000									
		lb_f	900									
Max. tilting moment	M_{2KMax}	Nm	236									
		in.lb	2089									
Efficiency at full load	η	%	94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000									
Weight incl. standard adapter plate	m	kg	5.2									
		lb_m	11.5									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66									
Max. permitted housing temperature		°C	+90									
		F	194									
Ambient temperature		°C	0 to +40									
		F	32 to 104									
Lubrication			Lubricated for life									
Paint			Blue RAL 5002									
Direction of rotation			Motor and gearhead opposite directions									
Protection class			IP 65									
Moment of inertia (relates to the drive)	C	14	J_1	kgcm²	0.54	0.45	0.44	0.40	0.44	0.36	0.35	0.34	0.34	0.34
				10^{-3} in.lb.s²	0.48	0.40	0.39	0.35	0.39	0.32	0.31	0.30	0.30	0.30
Clamping hub diameter [mm]	E	19	J_1	kgcm²	0.89	0.80	0.79	0.75	0.79	0.71	0.70	0.70	0.70	0.69
				10^{-3} in.lb.s²	0.79	0.71	0.70	0.66	0.70	0.63	0.62	0.62	0.62	0.61

[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

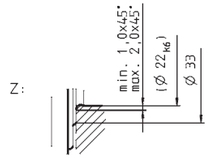
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

2-stage:

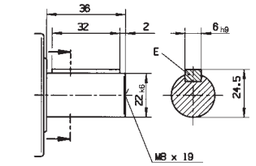


Z:

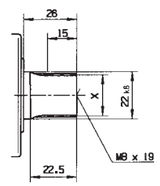


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 16 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SPK+ 075 3-stage

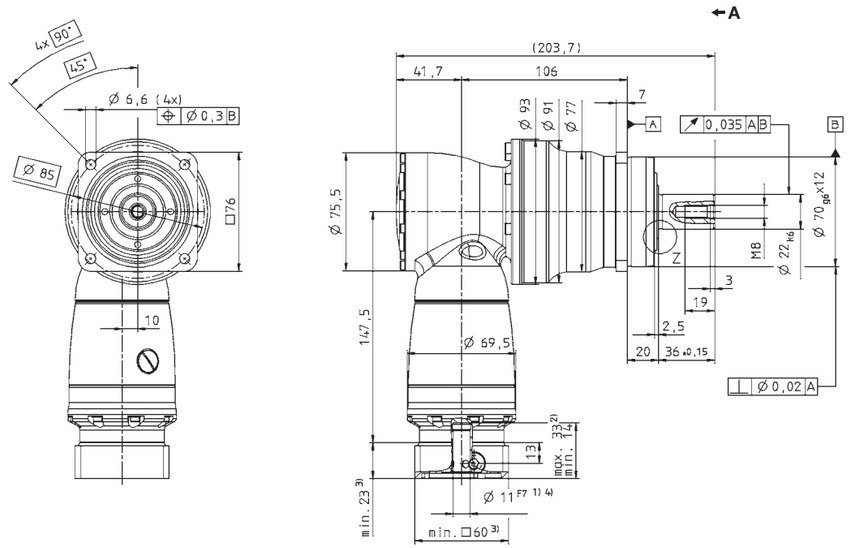
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	110	110	110	110	110	110	110	110	110	110	80	100	110	90
		in.lb	974	974	974	974	974	974	974	974	974	974	708	885	974	797
Nominal output torque (with n_{2N})	T_{2N}	Nm	75	75	75	75	75	75	75	75	75	75	60	75	75	52
		in.lb	664	664	664	664	664	664	664	664	664	664	531	664	664	460
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	160	160	200	200	200	200	200	200	250	175	120	150	210	200
		in.lb	1416	1416	1770	1770	1770	1770	1770	1770	2213	1549	1062	1328	1859	1770
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	4400	4400	4400	4400	4400	4400	4400	4800	4400	4800	5500	5500	5500	5500
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5500	5500	5500	5500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		in.lb	2.7	2.7	2.7	2.7	2.7	2.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin	Standard ≤ 5 / Reduced ≤ 3													
Torsional rigidity	C_{t21}	Nm/ arcmin	10													
		in.lb/ arcmin	89													
Max. axial force [e)]	F_{2AMax}	N	3350													
		lb_f	754													
Max. radial force [e)]	F_{2RMax}	N	4000													
		lb_f	900													
Max. tilting moment	M_{2KMax}	Nm	236													
		in.lb	2089													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standard adapter plate	m	kg	5.5													
		lb_m	12.2													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 66													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) **Clamping hub diameter [mm]**	B 11	J_1	kgcm²	0.09	0.07	0.08	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
			10^{-3} in.lb.s²	0.08	0.06	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	C 14	J_1	kgcm²	0.20	0.18	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
			10^{-3} in.lb.s²	0.18	0.16	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

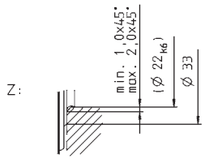
[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

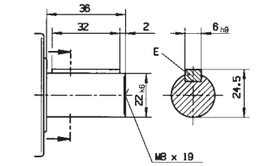
3-stage:



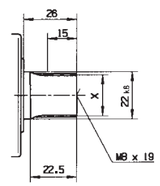


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 16 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SPK+ 100 2-stage

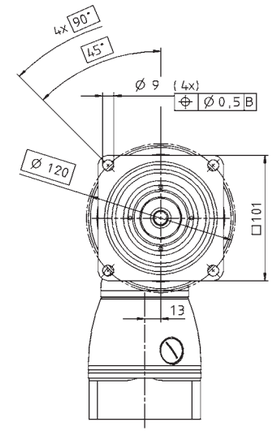
			2-stage									
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	280	280	300	300	300	300	200	250	300	225
		in.lb	2478	2478	2655	2655	2655	2655	1770	2213	2655	1991
Nominal output torque (with n_{2N})	T_{2N}	Nm	180	180	175	175	170	175	160	175	170	120
		in.lb	1593	1593	1549	1549	1505	1549	1416	1549	1505	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	400	400	500	500	625	500	400	500	625	500
		in.lb	3540	3540	4425	4425	5531	4425	3540	4425	5531	4425
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	2000	2400	2400	2700	2400	2500	2500	2500	2500	2500
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	3000	3400	3400	3800	3400	3200	3200	3200	3200	3200
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	2.5	2.1	2.0	1.8	2.0	2.2	2.0	2.0	2.0	2.0
		in.lb	22.1	18.6	17.7	15.9	17.7	19.5	17.7	17.7	17.7	17.7
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2									
Torsional rigidity	C_{t21}	Nm/ arcmin	31									
		in.lb/ arcmin	274									
Max. axial force [e]	F_{2AMax}	N	5650									
		lb_f	1271									
Max. radial force [e]	F_{2RMax}	N	6300									
		lb_f	1418									
Max. tilting moment	M_{2KMax}	Nm	487									
		in.lb	4310									
Efficiency at full load	η	%	94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000									
Weight incl. standard adapter plate	m	kg	9.7									
		lb_m	21.4									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68									
Max. permitted housing temperature		°C	+90									
		F	194									
Ambient temperature		°C	0 to +40									
		F	32 to 104									
Lubrication			Lubricated for life									
Paint			Blue RAL 5002									
Direction of rotation			Motor and gearhead opposite directions									
Protection class			IP 65									
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	E 19	J_1 kgcm²	1.48	1.20	1.17	1.05	1.15	0.95	0.90	0.89	0.89	0.89
		10^{-3} in.lb.s²	1.31	1.06	1.04	0.93	1.02	0.84	0.79	0.79	0.79	0.78
	H 28	J_1 kgcm²	2.89	2.62	2.59	2.46	2.56	2.36	2.31	2.31	2.30	2.30
		10^{-3} in.lb.s²	2.56	2.31	2.29	2.18	2.27	2.09	2.05	2.04	2.04	2.04

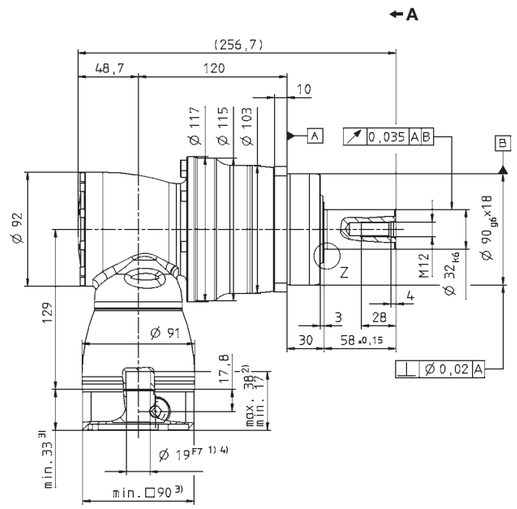
[a] Other ratios up to i=1000 available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

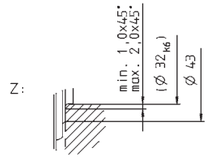
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

2-stage:

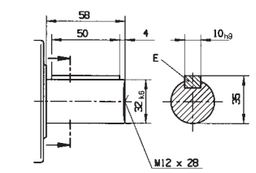




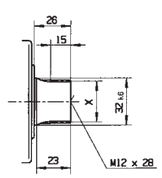


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 32 x 1.25 x 30 x 24 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SPK+ 100 3-stage

WITTENSTEIN

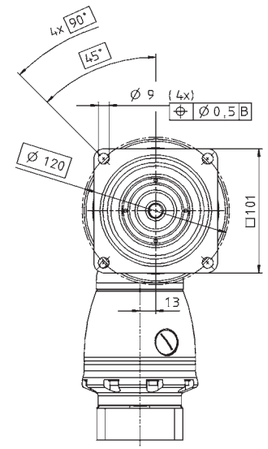
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	280	280	300	300	300	300	300	300	300	300	200	250	300	225
		in.lb	2478	2478	2655	2655	2655	2655	2655	2655	2655	2655	1770	2213	2655	1991
Nominal output torque (with n_{2N})	T_{2N}	Nm	180	180	175	175	175	175	175	175	170	175	160	175	170	120
		in.lb	1593	1593	1549	1549	1549	1549	1549	1549	1505	1549	1416	1549	1505	1062
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	400	400	500	500	500	500	500	500	625	500	400	500	625	500
		in.lb	3540	3540	4425	4425	4425	4425	4425	4425	5531	4425	3540	4425	5531	4425
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	3500	3500	3500	3500	3500	3500	3500	3800	3500	3800	4500	4500	4500	4500
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		in.lb	3.5	2.7	2.7	2.7	2.7	2.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2													
Torsional rigidity	C_{t21}	Nm/ arcmin	31													
		in.lb/ arcmin	274													
Max. axial force [e)]	F_{2AMax}	N	5650													
		lb_f	1271													
Max. radial force [e)]	F_{2RMax}	N	6300													
		lb_f	1418													
Max. tilting moment	M_{2KMax}	Nm	487													
		in.lb	4310													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standard adapter plate	m	kg	10.3													
		lb_m	22.8													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C 14	J_1	kgcm²	0.28	0.23	0.24	0.23	0.21	0.20	0.19	0.18	0.19	0.18	0.18	0.18	0.18	0.18
			10^{-3} in.lb.s²	0.25	0.20	0.21	0.20	0.19	0.18	0.17	0.16	0.17	0.16	0.16	0.16	0.16	0.16
	E 19	J_1	kgcm²	0.72	0.63	0.68	0.68	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
			10^{-3} in.lb.s²	0.64	0.56	0.60	0.60	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56

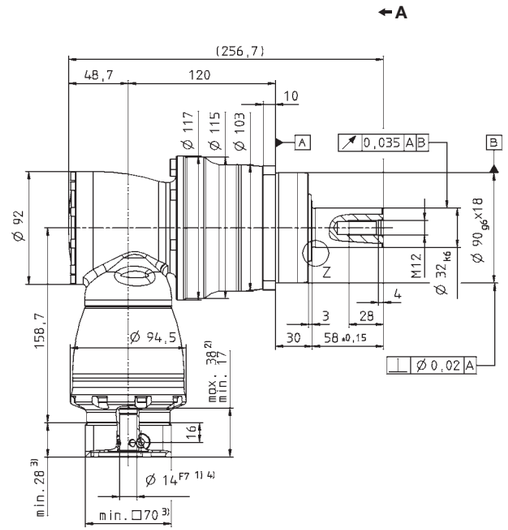
[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

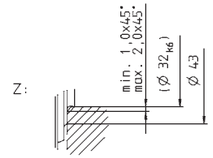
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

3-stage:

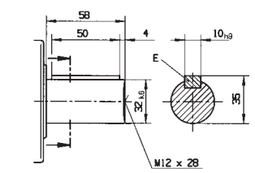




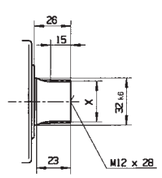


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 32 x 1.25 x 30 x 24 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual

SPK+ 140 2-stage

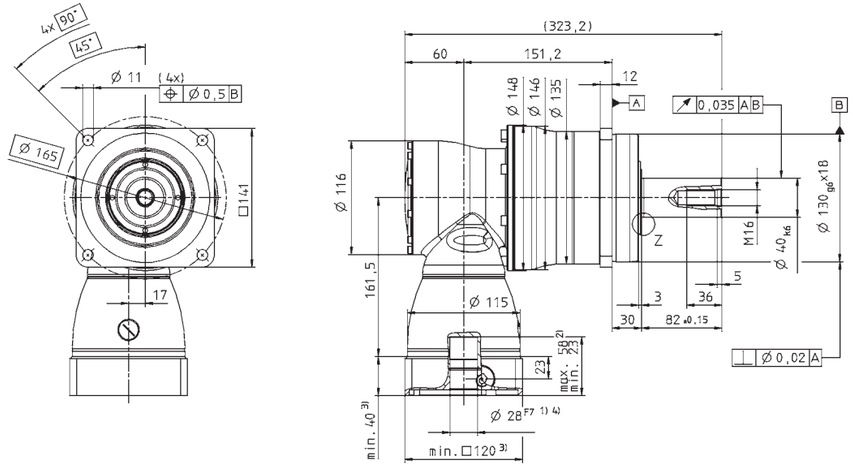
			2-stage									
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	600	600	600	600	600	600	500	600	600	480
		in.lb	5310	5310	5310	5310	5310	5310	4425	5310	5310	4248
Nominal output torque (with n_{2N})	T_{2N}	Nm	360	360	360	360	360	360	320	360	360	220
		in.lb	3186	3186	3186	3186	3186	3186	2832	3186	3186	1947
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1000	1000	1250	1250	1250	1250	1000	1250	1250	1000
		in.lb	8850	8850	11063	11063	11063	11063	8850	11063	11063	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	1900	2300	2300	2600	2300	2300	2300	2300	2300	2300
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2700	3100	3100	3500	3100	3000	3000	3000	3000	3000
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	4.0	3.7	3.6	2.8	3.5	3.9	3.1	3.1	3.1	3.1
		in.lb	35.4	32.7	31.9	24.8	31	34.5	27.4	27.4	27.4	27.4
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2									
Torsional rigidity	C_{t21}	Nm/ arcmin	53									
		in.lb/ arcmin	469									
Max. axial force [e]	F_{2AMax}	N	9870									
		lb_f	2221									
Max. radial force [e]	F_{2RMax}	N	9450									
		lb_f	2126									
Max. tilting moment	M_{2KMax}	Nm	952									
		in.lb	8425									
Efficiency at full load	η	%	94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000									
Weight incl. standard adapter plate	m	kg	20									
		lb_m	44									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68									
Max. permitted housing temperature		°C	+90									
		F	194									
Ambient temperature		°C	0 to +40									
		F	32 to 104									
Lubrication			Lubricated for life									
Paint			Blue RAL 5002									
Direction of rotation			Motor and gearhead opposite directions									
Protection class			IP 65									
Moment of inertia (relates to the drive)	H	28	J_1	kgcm²	4.68	3.82	3.75	3.31	3.68	2.97	2.80	2.79	2.78	2.77
				10^{-3} in.lb.s²	4.14	3.38	3.32	2.93	3.26	2.63	2.48	2.47	2.46	2.45
Clamping hub diameter [mm]	K	38	J_1	kgcm²	11.8	11.0	10.9	10.5	10.9	10.1	9.96	9.95	9.94	9.94
				10^{-3} in.lb.s²	10.5	9.73	9.66	9.27	9.60	8.97	8.82	8.81	8.80	8.79

[a] Other ratios up to i=1000 available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

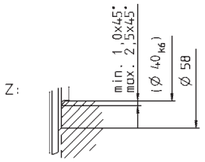
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

2-stage:

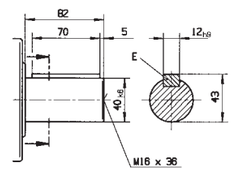


Z:

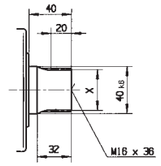


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 40 x 2 x 30 x 18 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual

SPK+ 140 3-stage

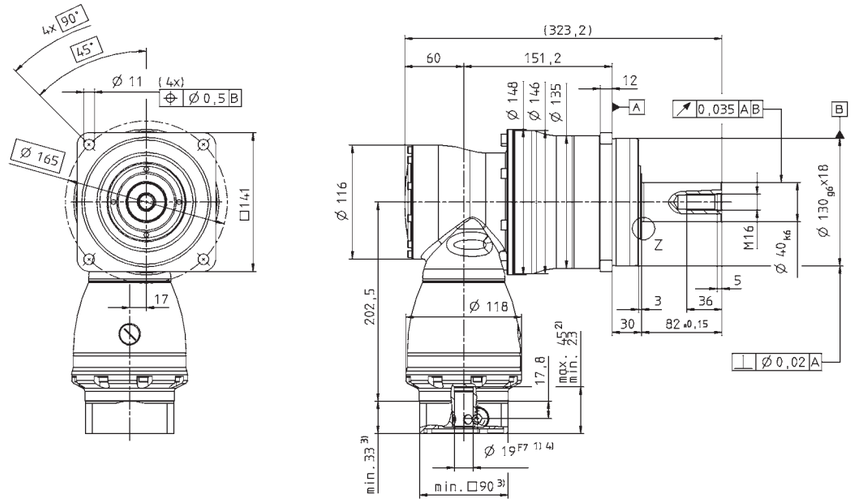
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	600	600	600	600	600	600	600	600	600	600	500	600	600	480
		in.lb	5310	5310	5310	5310	5310	5310	5310	5310	5310	5310	4425	5310	5310	4248
Nominal output torque (with n_{2N})	T_{2N}	Nm	360	360	360	360	360	360	360	360	360	360	320	360	360	220
		in.lb	3186	3186	3186	3186	3186	3186	3186	3186	3186	3186	2832	3186	3186	1947
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1000	1000	1250	1250	1250	1250	1250	1250	1250	1250	1000	1250	1250	1000
		in.lb	8850	8850	11063	11063	11063	11063	11063	11063	11063	11063	8850	11063	11063	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	3100	3100	3100	3100	3100	3100	3100	3500	3100	3500	4200	4200	4200	4200
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4200	4200	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	0.7	0.4	0.6	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		in.lb	6.2	3.5	5.3	4.4	4.4	3.5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2													
Torsional rigidity	C_{t21}	Nm/ arcmin	53													
		in.lb/ arcmin	469													
Max. axial force [e]	F_{2AMax}	N	9870													
		lb_f	2221													
Max. radial force [e]	F_{2RMax}	N	9450													
		lb_f	2126													
Max. tilting moment	M_{2KMax}	Nm	952													
		in.lb	8425													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standard adapter plate	m	kg	20.7													
		lb_m	45.7													
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	< 68													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) **Clamping hub diameter [mm]**	**E**	**19**	J_1	kgcm²	1.01	0.76	0.88	0.85	0.76	0.75	0.70	0.69	0.70	0.69	0.69	0.69	0.69	0.69
				10^{-3} in.lb.s²	0.89	0.67	0.78	0.75	0.67	0.66	0.62	0.61	0.62	0.61	0.61	0.61	0.61	0.61
	G	**24**	J_1	kgcm²	2.57	2.32	2.44	2.42	2.32	2.31	2.26	2.25	2.26	2.25	2.25	2.25	2.25	2.25
				10^{-3} in.lb.s²	2.27	2.05	2.16	2.14	2.05	2.04	2.00	1.99	2.00	1.99	1.99	1.99	1.99	1.99

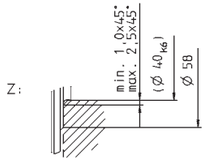
[a] Other ratios up to i=1000 available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

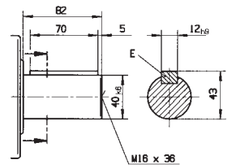
3-stage:



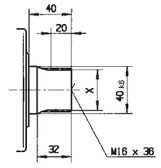


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 40 x 2 x 30 x 18 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SPK+ 180 2-stage

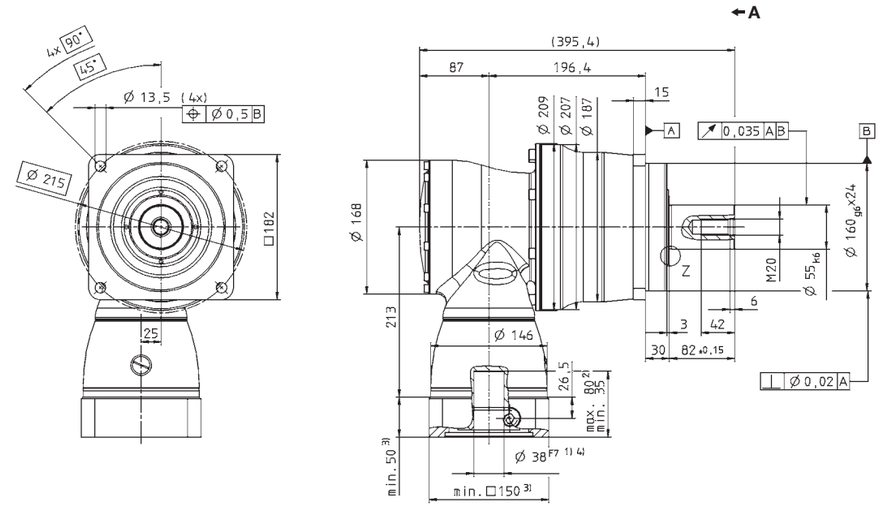
			2-stage									
Ratio [a]	i		**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1100	1100	1100	1100	1100	1100	840	1050	1100	880
		in.lb	9735	9735	9735	9735	9735	9735	7434	9293	9735	7788
Nominal output torque (with n_{2N})	T_{2N}	Nm	750	750	750	750	750	750	640	750	750	750
		in.lb	6638	6638	6638	6638	6638	6638	5664	6638	6638	6638
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1600	1600	2000	2000	2750	2000	1600	2000	2750	2200
		in.lb	14160	14160	17700	17700	24338	17700	14160	17700	24338	19470
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	1600	1900	1900	2100	1900	2100	2100	2100	2100	2100
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2300	2600	2600	2800	2600	3000	3000	3000	3000	3000
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	9.0	6.5	6.5	5.5	6.0	8.0	6.0	6.0	6.0	6.0
		in.lb	79.7	57.5	57.5	48.7	53.1	70.8	53.1	53.1	53.1	53.1
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2									
Torsional rigidity	C_{t21}	Nm/ arcmin	175									
		in.lb/ arcmin	1549									
Max. axial force [e)]	F_{2AMax}	N	14150									
		lb_f	3184									
Max. radial force [e)]	F_{2RMax}	N	14700									
		lb_f	3308									
Max. tilting moment	M_{2KMax}	Nm	1600									
		in.lb	14160									
Efficiency at full load	η	%	94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000									
Weight incl. standardadapter plate	m	kg	45									
		lb_m	99									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 70									
Max. permitted housing temperature		°C	+90									
		F	194									
Ambient temperature		°C	0 to +40									
		F	32 to 104									
Lubrication			Lubricated for life									
Paint			Blue RAL 5002									
Direction of rotation			Motor and gearhead opposite directions									
Protection class			IP 65									
Moment of inertia (relates to the drive) **Clamping hub diameter [mm]**	**K**	**38**	J_1	kgcm²	24.7	19.5	19.0	16.3	18.6	14.0	12.9	12.8	12.7	12.7
				10^{-3} in.lb.s²	21.9	17.2	16.8	14.4	16.5	12.4	11.4	11.3	11.3	11.2

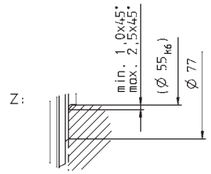
[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

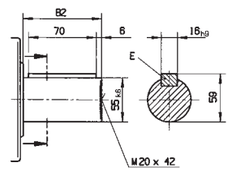
2-stage:



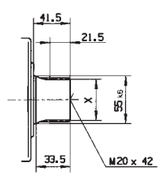


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 55 x 2 x 30 x 26 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

⚠ Motor mounting according to operating manual

SPK+ 180 3-stage

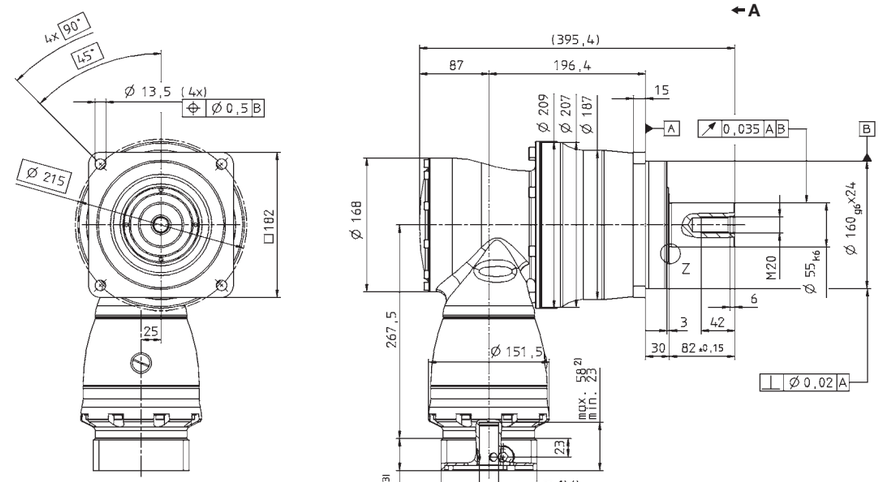
			3-stage													
Ratio [a]	i		**64**	**84**	**100**	**125**	**140**	**175**	**200**	**250**	**280**	**350**	**400**	**500**	**700**	**1000**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	840	1050	1100	880
		in.lb	9735	9735	9735	9735	9735	9735	9735	9735	9735	9735	7434	9293	9735	7788
Nominal output torque (with n_{2N})	T_{2N}	Nm	750	750	750	750	750	750	750	750	750	750	640	750	750	750
		in.lb	6638	6638	6638	6638	6638	6638	6638	6638	6638	6638	5664	6638	6638	6638
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1600	1600	2000	2000	2000	2000	2000	2000	2750	2000	1600	2000	2750	2200
		in.lb	14160	14160	17700	17700	17700	17700	17700	17700	24338	17700	14160	17700	24338	19470
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm	2900	2900	2900	2900	2900	2900	2900	3200	2900	3200	3900	3900	3900	3900
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4200	4200	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1=3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm	1	0.5	0.8	0.6	0.6	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4
		in.lb	8.9	4.4	7.1	5.3	5.3	4.4	4.4	3.5	4.4	3.5	3.5	3.5	3.5	3.5
Max. torsional backlash	j_t	arcmin	Standard ≤ 4 / Reduced ≤ 2													
Torsional rigidity	C_{t21}	Nm/ arcmin	175													
		in.lb/ arcmin	1549													
Max. axial force [e)]	F_{2AMax}	N	14150													
		lb_f	3184													
Max. radial force [e)]	F_{2RMax}	N	14700													
		lb_f	3308													
Max. tilting moment	M_{2KMax}	Nm	1600													
		in.lb	14160													
Efficiency at full load	η	%	92													
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000													
Weight incl. standardadapter plate	m	kg	47.4													
		lb_m	104.8													
Operating noise (with n_1=3000 rpm no load)	L_{PA}	dB(A)	< 70													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead opposite directions													
Protection class			IP 65													
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G 24	J_1	kgcm²	3.97	2.82	3.36	3.22	2.82	2.75	2.50	2.47	2.50	2.44	2.42	2.42	2.42	2.42
			10^{-3} in.lb.s²	3.51	2.50	2.97	2.85	2.50	2.43	2.21	2.19	2.21	2.16	2.14	2.14	2.14	2.14
	K 38	J_1	kgcm²	10.90	9.74	10.30	10.10	9.74	9.66	9.41	9.38	9.41	9.38	9.33	9.33	9.33	9.33
			10^{-3} in.lb.s²	9.65	8.62	9.12	8.94	8.62	8.55	8.33	8.30	8.33	8.30	8.26	8.26	8.26	8.26

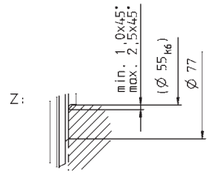
[a)] Other ratios up to i=1000 available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

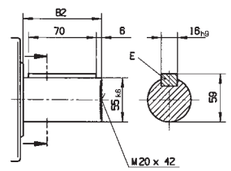
3-stage:



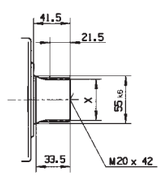


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key as per DIN 6885, sheet 1, form A



Involute gearing DIN 5480 in mm
X = W 55 x 2 x 30 x 26 x 6m, DIN 5480



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual

HG⁺ – New hollow shaft precision

The successor to our versatile hypoid gearhead with hollow shaft on one/both sides

See our website and our separate flyer for more information about our washdown solutions

Shrink disc

HG⁺

Specifications \ Version	HG⁺		
	+	++	+++
Positioning accuracy			
Rigidity			
Smooth-running			
Speed capacity			
Power density			
Max. axial/radial forces			

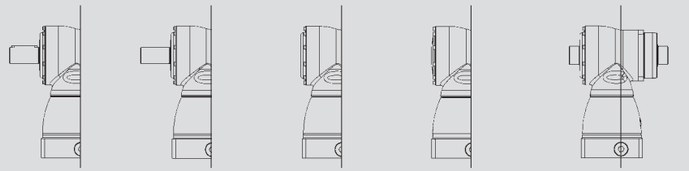
Options

Plug-in drive coupling
Washdown version
ATEX version
Food-grade grease

Accessories

Shrink disc (see page 202)

The modular principle



HG+ 060 1/2-stage

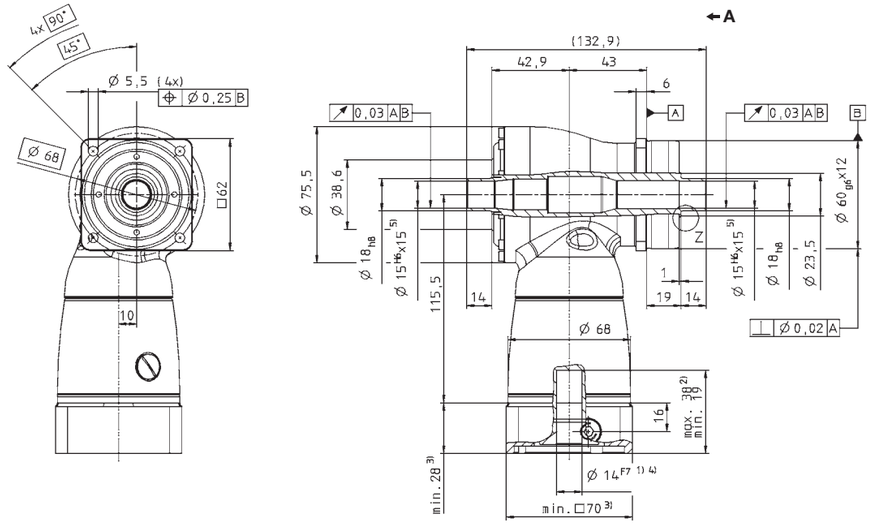
				1-stage					2-stage									
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm		30	30	30	25	20	30	30	30	30	30	30	30	30	25	20
		in.lb		266	266	266	221	177	266	266	266	266	266	266	266	266	221	177
Nominal output torque (with n_{1N})	T_{2N}	Nm		22	22	22	20	15	22	22	22	22	22	22	22	22	20	15
		in.lb		195	195	195	177	133	195	195	195	195	195	195	195	195	177	133
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm		40	50	50	45	40	50	50	50	50	50	50	50	50	45	40
		in.lb		354	443	443	398	354	443	443	443	443	443	443	443	443	398	354
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}	rpm		2500	2700	3000	3000	3000	4400	4400	4400	4400	4400	4400	4400	4800	5500	5500
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm		3000	3500	4000	3500	3500	5000	5000	5000	5000	5000	5000	5000	5000	5500	5500
Max. input speed	n_{1Max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}	Nm		1.3	1.2	1.1	1.3	1.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
		in.lb		11.5	10.6	9.7	11.5	10.6	1.8	1.8	1.8	1.8	1.8	1.8	0.9	0.9	0.9	0.9
Max. torsional backlash	j_t	arcmin		≤ 5														
Torsional rigidity	C_{t21}	Nm/ arcmin		2.2	2.3	2.4	2.2	1.9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.2	1.9
		in.lb/ arcmin		19	20	21	19	17	20	20	20	20	20	20	20	21	19	17
Max. axial force [e)]	F_{2AMax}	N		2400														
		lb_f		540														
Max. radial force [e)]	F_{2RMax}	N		2700														
		lb_f		608														
Max. tilting moment	M_{2KMax}	Nm		251														
		in.lb		2220														
Efficiency at full load	η	%		96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h		> 20000														
Weight incl. standard adapter plate	m	kg		2.9					3.2									
		lb_m		6.4					7.1									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)		≤ 64														
Max. permitted housing temperature		°C		+90														
		F		194														
Ambient temperature		°C		0 to +40														
		F		32 to 104														
Lubrication				Lubricated for life														
Paint				Blue RAL 5002														
Direction of rotation				Motor and gearhead opposite directions														
Protection class				IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	B	11	J_1	kgcm²	–	–	–	–	–	0.09	0.09	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06
				10^{-3} in.lb.s²						0.08	0.08	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05
	C	14	J_1	kgcm²	0.52	0.44	0.40	0.36	0.34	0.20	0.20	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.17
				10^{-3} in.lb.s²	0.46	0.39	0.35	0.32	0.30	0.18	0.18	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15
	E	19	J_1	kgcm²	0.87	0.79	0.75	0.71	0.70	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	0.77	0.70	0.66	0.63	0.62										

[a)] Other ratios available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

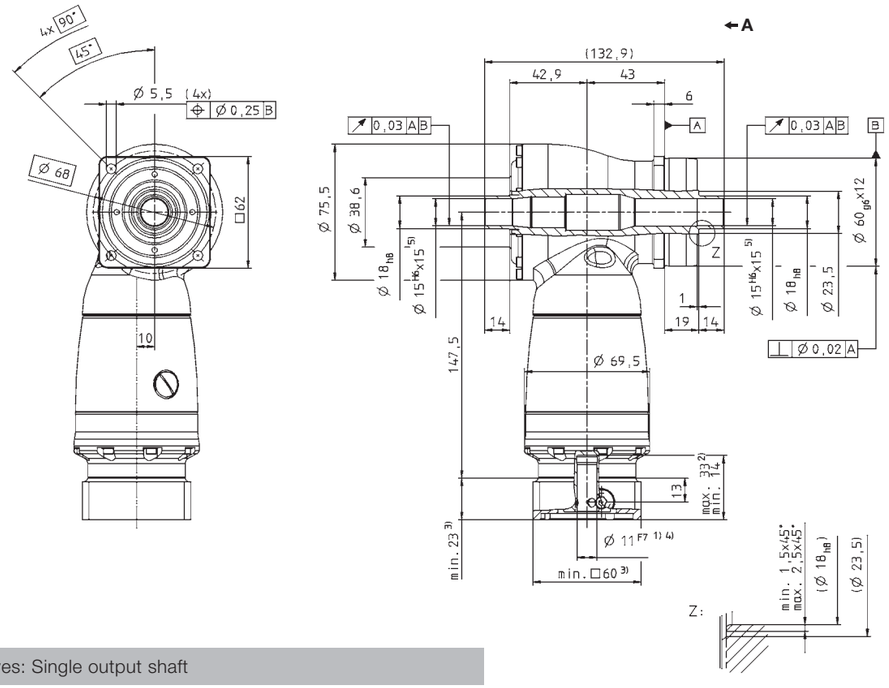
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

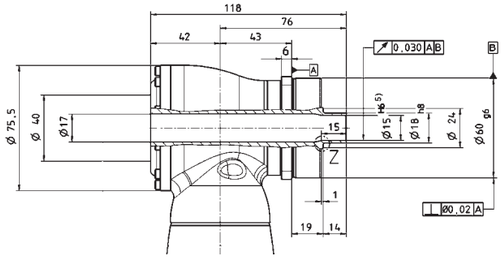
1-stage:



2-stage:



Alternatives: Single output shaft



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

HG+ 075 1/2-stage

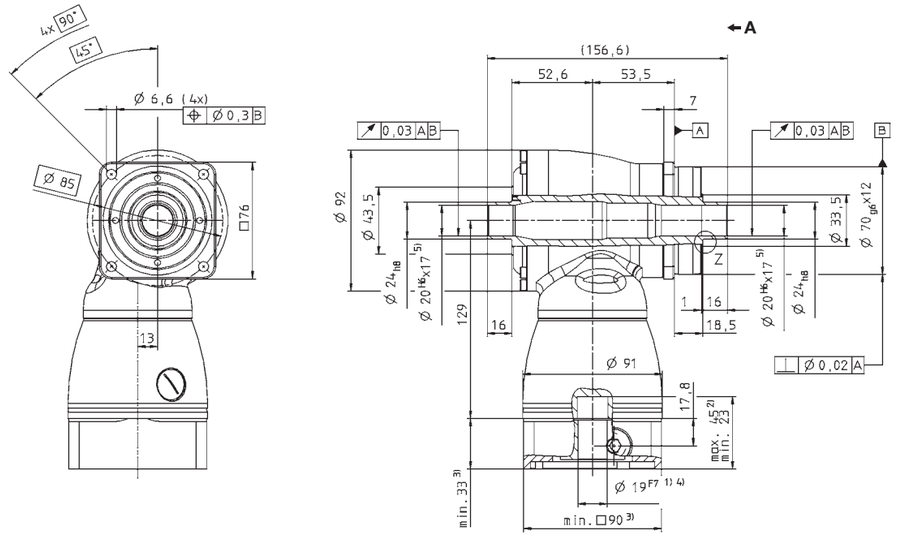
				1-stage					2-stage									
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	70	70	70	60	50	70	70	70	70	70	70	70	70	60	50
			in.lb	620	620	620	531	443	620	620	620	620	620	620	620	620	531	443
Nominal output torque (with n_{2N})	T_{2N}		Nm	50	50	50	45	40	50	50	50	50	50	50	50	50	45	40
			in.lb	443	443	443	398	354	443	443	443	443	443	443	443	443	398	354
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	95	115	115	110	100	115	115	115	115	115	115	115	115	110	100
			in.lb	841	1018	1018	974	885	1018	1018	1018	1018	1018	1018	1018	1018	974	885
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b), c)]	n_{1N}		rpm	2300	2500	2800	2800	2800	3500	3500	3500	3500	3500	3500	3500	3800	4500	4500
Max. continuous speed (with 20?% T_{2N} and 20°C ambient temperature)	n_{1Ncym}		rpm	3000	3500	4000	3500	3500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}		rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d)]	T_{012}		Nm	2.2	1.9	1.7	2.2	2.0	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
			in.lb	19	17	15	19	18	2.7	2.7	1.8	1.8	1.8	1.8	0.9	0.9	0.9	0.9
Max. torsional backlash	j_t		arcmin	≤ 4														
Torsional rigidity	C_{t21}		Nm/ arcmin	5.3	5.9	6.7	6.6	6.5	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.7	6.6	6.5
			in.lb/ arcmin	47	52	60	58	57	52	52	52	52	52	52	52	59	58	58
Max. axial force [e)]	F_{2AMax}		N	3400														
			lb_f	765														
Max. radial force [e)]	F_{2RMax}		N	4000														
			lb_f	900														
Max. tilting moment	M_{2KMax}		Nm	437														
			in.lb	3867														
Efficiency at full load	η		%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h		h	> 20000														
Weight incl. standard adapter plate	m		kg	4.8					5.1									
			lb_m	10.6					11.3									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}		dB(A)	≤ 66														
Max. permitted housing temperature			°C	+90														
			F	194														
Ambient temperature			°C	0 to +40														
			F	32 to 104														
Lubrication				Lubricated for life														
Paint				Blue RAL 5002														
Direction of rotation				Motor and gearhead opposite directions														
Protection class				IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	C	14	J_1	kgcm²	–	–	–	–	–	0.28	0.27	0.23	0.23	0.20	0.20	0.18	0.18	0.18	0.18
				10^{-3} in.lb.s²						0.25	0.24	0.21	0.20	0.18	0.18	0.16	0.16	0.16	0.16
	E	19	J_1	kgcm²	1.46	1.19	1.06	0.95	0.90	0.73	0.71	0.68	0.67	0.63	0.62	0.63	0.63	0.63	0.63
				10^{-3} in.lb.s²	1.29	1.05	0.94	0.84	0.79	0.64	0.63	0.60	0.59	0.55	0.55	0.56	0.55	0.55	0.55
	H	28	J_1	kgcm²	2.86	2.60	2.47	2.36	2.31	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	2.53	2.30	2.19	2.09	2.04										

[a)] Other ratios available on request
[b)] Higher speeds are possible if the nominal torque is reduced
[c)] For higher ambient temperatures, please reduce input speed
[d)] Idling torques decrease during operation
[e)] Refers to center of the output shaft or flange

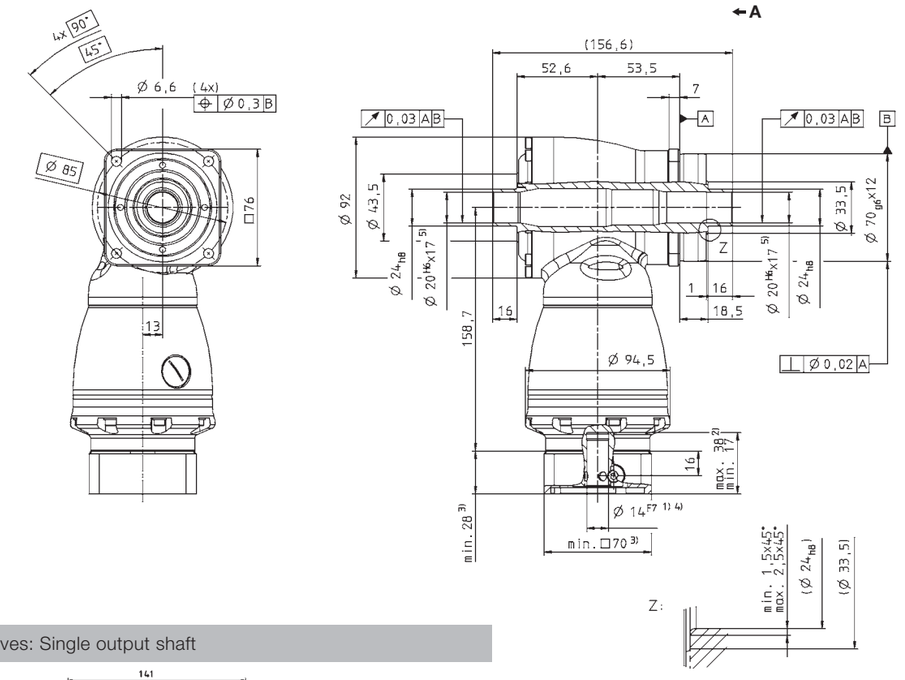
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

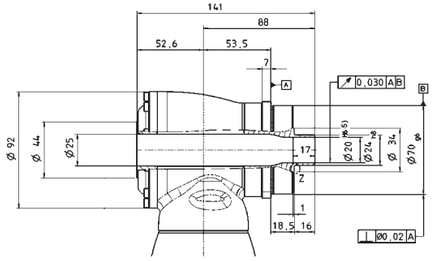
1-stage:



2-stage:



Alternatives: Single output shaft



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

HG+ 100 1/2-stage

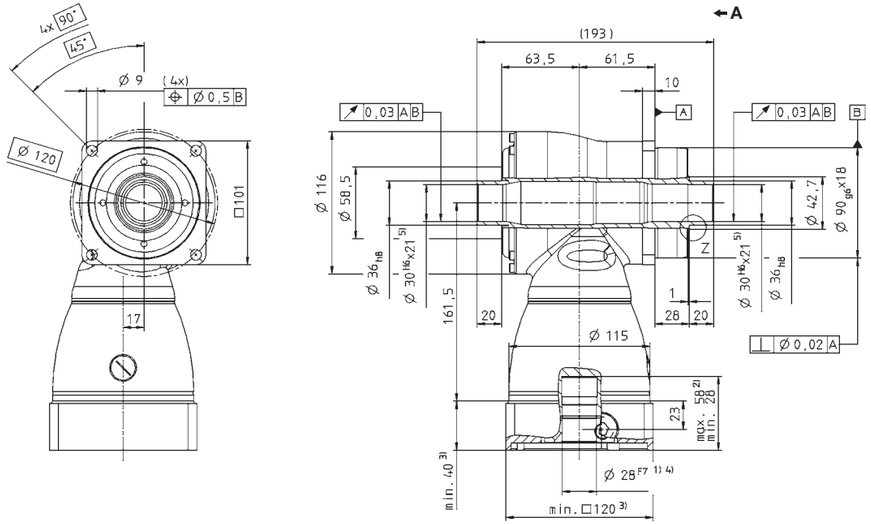
				1-stage					2-stage									
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	170	170	170	145	125	170	170	170	170	170	170	170	170	145	125
			in.lb	1505	1505	1505	1283	1106	1505	1505	1505	1505	1505	1505	1505	1505	1283	1106
Nominal output torque (with n_{2N})	T_{2N}		Nm	100	100	100	90	80	100	100	100	100	100	100	100	100	90	80
			in.lb	885	885	885	797	708	885	885	885	885	885	885	885	885	797	708
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	220	260	260	255	250	260	260	260	260	260	260	260	260	255	250
			in.lb	1947	2301	2301	2257	2213	2301	2301	2301	2301	2301	2301	2301	2301	2257	2213
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}		rpm	2200	2400	2700	2500	2500	3100	3100	3100	3100	3100	3100	3100	3500	4200	4200
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}		rpm	3000	3400	3800	3400	3400	4000	4000	4000	4000	4000	4000	4000	4000	4200	4200
Max. input speed	n_{1Max}		rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}		Nm	4.2	3.3	2.5	3.9	3.1	0.7	0.7	0.6	0.4	0.4	0.3	0.2	0.2	0.2	0.2
			in.lb	37	29	22	35	27	6.2	6.2	5.3	3.5	3.5	2.7	1.8	1.8	1.8	1.8
Max. torsional backlash	j_t		arcmin	≤ 4														
Torsional rigidity	C_{t21}		Nm/ arcmin	10.7	12.1	14.0	14.2	14.4	12.1	12.1	12.1	12.1	12.1	12.1	12.1	14.0	14.2	14.4
			in.lb/ arcmin	95	107	124	126	127	107	107	107	107	107	107	107	124	126	127
Max. axial force [e]	F_{2AMax}		N	5700														
			lb_f	1283														
Max. radial force [e]	F_{2RMax}		N	6300														
			lb_f	1418														
Max. tilting moment	M_{2KMax}		Nm	833														
			in.lb	7370														
Efficiency at full load	η		%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h		h	> 20000														
Weight incl. standard adapter plate	m		kg	9.3					9.5									
			lb_m	21					21									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}		dB(A)	≤ 66														
Max. permitted housing temperature			°C	+90														
			F	194														
Ambient temperature			°C	0 to +40														
			F	32 to 104														
Lubrication				Lubricated for life														
Paint				Blue RAL 5002														
Direction of rotation				Motor and gearhead opposite directions														
Protection class				IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	E	19	J_1	kgcm²	–	–	–	–	–	1.02	0.97	0.86	0.84	0.75	0.74	0.69	0.69	0.68	0.68
				10^{-3} in.lb.s²						0.91	0.86	0.76	0.74	0.66	0.66	0.61	0.61	0.60	0.60
	G	24	J_1	kgcm²	–	–	–	–	–	2.59	2.54	2.42	2.40	2.31	2.30	2.26	2.25	2.25	2.25
				10^{-3} in.lb.s²						2.29	2.25	2.14	2.13	2.05	2.04	2.00	1.99	1.99	1.99
	H	28	J_1	kgcm²	4.64	3.80	3.34	2.98	2.79	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	4.10	3.36	2.95	2.64	2.47										
	K	38	J_1	kgcm²	11.8	11.0	10.6	10.2	10.0	–	–	–	–	–	–	–	–	–	–
				10^{-3} in.lb.s²	10.4	9.73	9.34	9.04	8.88										

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

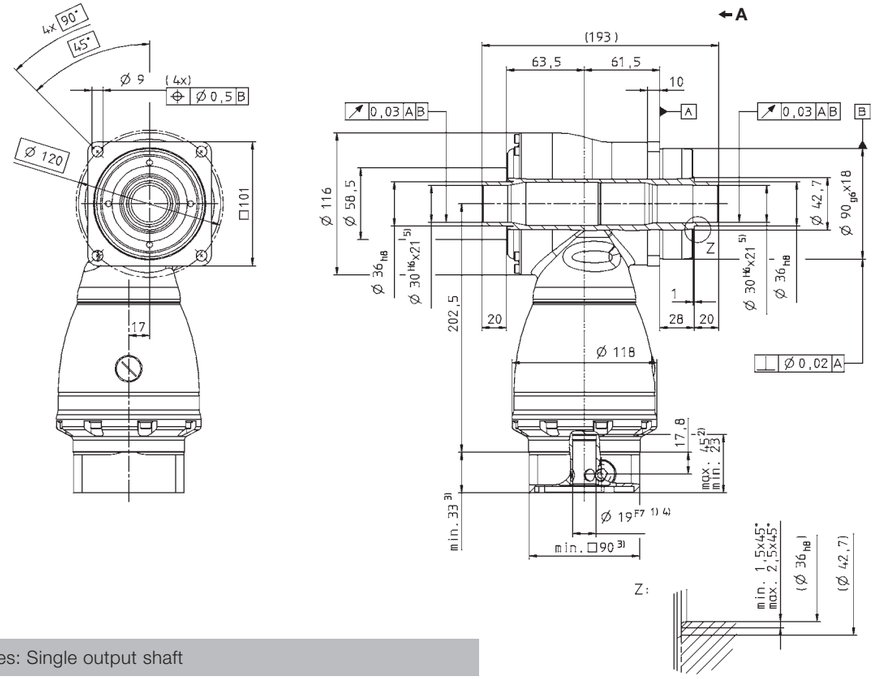
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

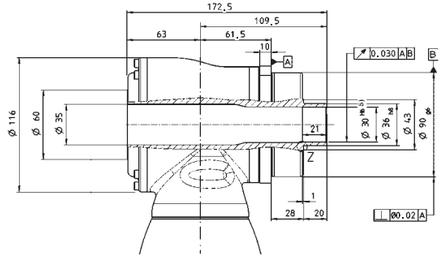
1-stage:



2-stage:



Alternatives: Single output shaft



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

HG+ 140 1/2-stage

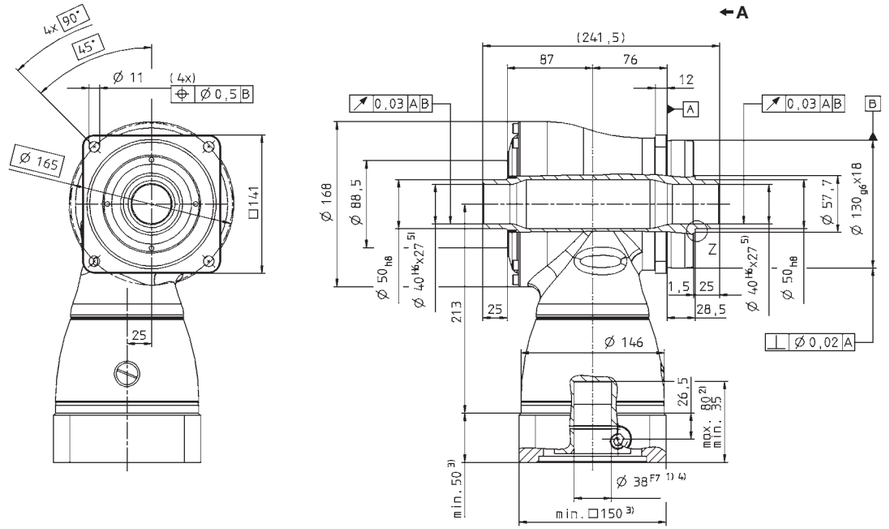
			1-stage					2-stage									
Ratio [a]	i		**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	300	300	300	250	210	300	300	300	300	300	300	300	300	250	210
		in.lb	2655	2655	2655	2213	1859	2655	2655	2655	2655	2655	2655	2655	2655	2213	1859
Nominal output torque (with n_{2N})	T_{2N}	Nm	190	190	190	175	160	190	190	190	190	190	190	190	190	175	160
		in.lb	1682	1682	1682	1549	1416	1682	1682	1682	1682	1682	1682	1682	1682	1549	1416
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	400	500	500	450	400	500	500	500	500	500	500	500	500	450	400
		in.lb	3540	4425	4425	3983	3540	4425	4425	4425	4425	4425	4425	4425	4425	3983	3540
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}	rpm	1900	2000	2200	2000	2000	2900	2900	2900	2900	2900	2900	2900	3200	3200	3900
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}	rpm	2500	2800	3100	2800	2800	4000	4000	4000	4000	4000	4000	4000	4200	4200	4200
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}	Nm	7.7	5.7	5.0	8.3	6.1	1.5	1.0	0.8	0.6	0.6	0.4	0.4	0.3	0.3	0.3
		in.lb	68	50	44	73	54	13.3	8.9	7.1	5.3	5.3	3.5	3.5	2.7	2.7	2.7
Max. torsional backlash	j_t	arcmin	≤ 4														
Torsional rigidity	C_{t21}	Nm/ arcmin	32	36	41	39	38	36	36	36	36	36	36	36	41	39	38
		in.lb/ arcmin	287	321	360	346	337	319	319	319	319	319	319	319	363	345	336
Max. axial force [e]	F_{2AMax}	N	9900														
		lb_f	2228														
Max. radial force [e]	F_{2RMax}	N	9500														
		lb_f	2138														
Max. tilting moment	M_{2KMax}	Nm	1692														
		in.lb	14974														
Efficiency at full load	η	%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000														
Weight incl. standardadapter plate	m	kg	22.6					24									
		lb_m	50					53									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	≤ 68														
Max. permitted housing temperature		°C	+90														
		F	194														
Ambient temperature		°C	0 to +40														
		F	32 to 104														
Lubrication			Lubricated for life														
Paint			Blue RAL 5002														
Direction of rotation			Motor and gearhead opposite directions														
Protection class			IP 65														
Moment of inertia (relates to the drive) Clamping hub diameter [mm]	G 24	J_1	kgcm²	–	–	–	–	–	4.20	3.84	3.27	3.16	2.78	2.73	2.48	2.45	2.43	2.42
			10^{-3} in.lb.s²						3.71	3.40	2.90	2.80	2.46	2.41	2.20	2.17	2.15	2.14
	K 38	J_1	kgcm²	25.0	19.1	16.3	14.1	12.8	11.1	10.7	10.2	10.1	9.69	9.64	9.39	9.37	9.34	9.33
			10^{-3} in.lb.s²	22.1	16.9	14.4	12.4	11.3	9.83	9.51	9.01	8.92	8.58	8.53	8.31	8.29	8.27	8.26

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

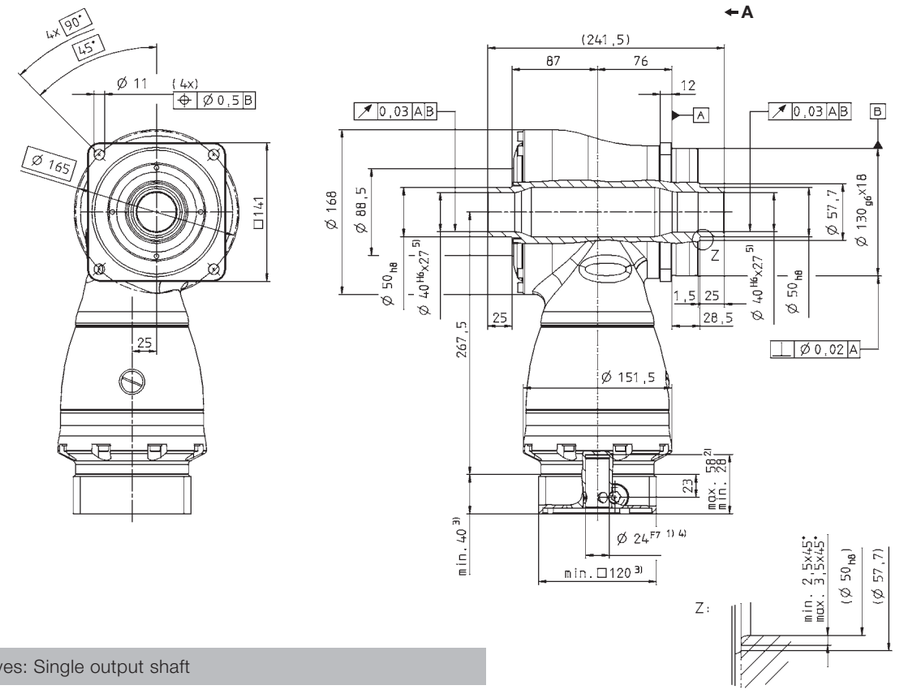
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

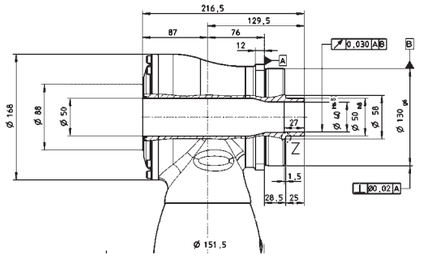
1-stage:



2-stage:



Alternatives: Single output shaft



See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

Motor mounting according to operating manual

HG+ 180 1/2-stage

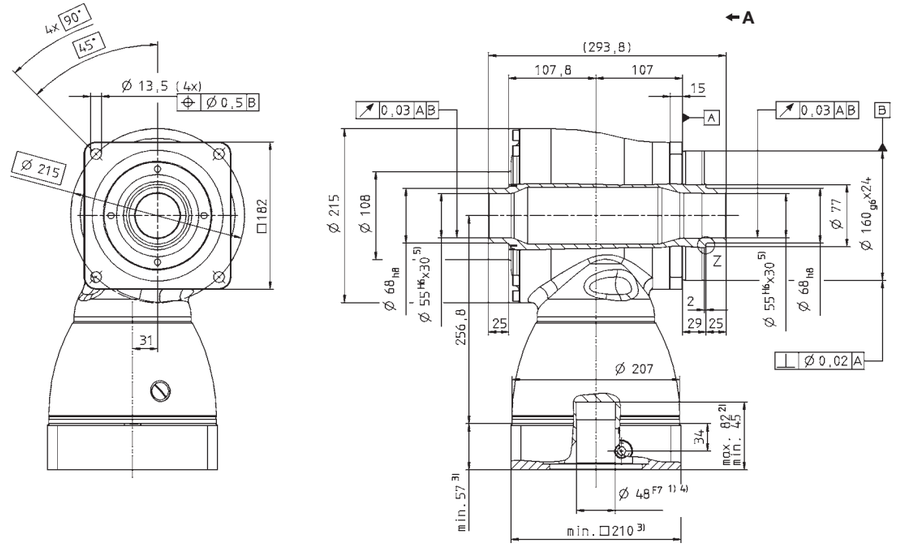
				1-stage					2-stage									
Ratio [a]	i			**3**	**4**	**5**	**7**	**10**	**12**	**16**	**20**	**25**	**28**	**35**	**40**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}		Nm	640	640	640	550	470	640	640	640	640	640	640	640	640	550	470
			in.lb	5664	5664	5664	4868	4160	5664	5664	5664	5664	5664	5664	5664	5664	4868	4160
Nominal output torque (with n_{1N})	T_{2N}		Nm	400	400	400	380	360	400	400	400	400	400	400	400	400	380	360
			in.lb	3540	3540	3540	3363	3186	3540	3540	3540	3540	3540	3540	3540	3540	3363	3186
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}		Nm	900	1050	1050	970	900	1050	1050	1050	1050	1050	1050	1050	1050	970	900
			in.lb	7965	9293	9293	8585	7965	9293	9293	9293	9293	9293	9293	9293	9293	8585	7965
Nominal input speed (with T_{2N} and 20°C ambient temperature) [b], [c]	n_{1N}		rpm	1600	1800	2000	1800	1800	2700	2700	2700	2700	2700	2700	2700	2900	3200	3400
Max. continuous speed (with 20% T_{2N} and 20°C ambient temperature)	n_{1Ncym}		rpm	2000	2400	2800	2500	2500	3500	3500	3500	3500	3500	3500	3500	3500	3800	3800
Max. input speed	n_{1Max}		rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature) [d]	T_{012}		Nm	16.0	13.0	11.0	16.5	14.0	3.3	2.5	2.0	1.8	1.4	1.3	1.0	1.0	1.0	1.0
			in.lb	142	115	97	146	124	29.2	22.1	17.7	15.9	12.4	11.5	8.9	8.9	8.9	8.9
Max. torsional backlash	j_t		arcmin	≤ 4														
Torsional rigidity	C_{t21}		Nm/ arcmin	71	80	91	89	88	80	80	80	80	80	80	80	91	89	88
			in.lb/ arcmin	633	711	803	791	780	708	708	708	708	708	708	708	805	788	779
Max. axial force [e]	F_{2AMax}		N	14200														
			lb_f	3195														
Max. radial force [e]	F_{2RMax}		N	14700														
			lb_f	3308														
Max. tilting moment	M_{2KMax}		Nm	3213														
			in.lb	28435														
Efficiency at full load	η		%	96					94									
Service life (For calculation, see the Chapter "Information")	L_h		h	> 20000														
Weight incl. standardadapter plate	m		kg	45.4					47									
			lb_m	100					104									
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}		dB(A)	≤ 68														
Max. permitted housing temperature			°C	+90														
			F	194														
Ambient temperature			°C	0 to +40														
			F	32 to 104														
Lubrication				Lubricated for life														
Paint				Blue RAL 5002														
Direction of rotation				Motor and gearhead opposite directions														
Protection class				IP 65														
Moment of inertia (relates to the drive)	K	38	J_1	kgcm²	–	–	–	–	–	15.3	13.9	12.3	12.0	10.9	10.7	10.1	10.0	9.95	9.91
				10^{-3} in.lb.s²						13.5	12.3	10.9	10.6	9.65	9.48	8.96	8.88	8.80	8.77
Clamping hub diameter [mm]	M	48	J_1	kgcm²	73.3	51.6	42.1	34.0	29.7	30.0	28.7	27.0	26.7	25.6	25.4	24.8	24.7	24.7	24.6
				10^{-3} in.lb.s²	64.9	45.6	37.3	30.1	26.3	26.6	25.4	23.9	23.6	22.7	22.5	22.0	21.9	21.8	21.8

[a] Other ratios available on request
[b] Higher speeds are possible if the nominal torque is reduced
[c] For higher ambient temperatures, please reduce input speed
[d] Idling torques decrease during operation
[e] Refers to center of the output shaft or flange

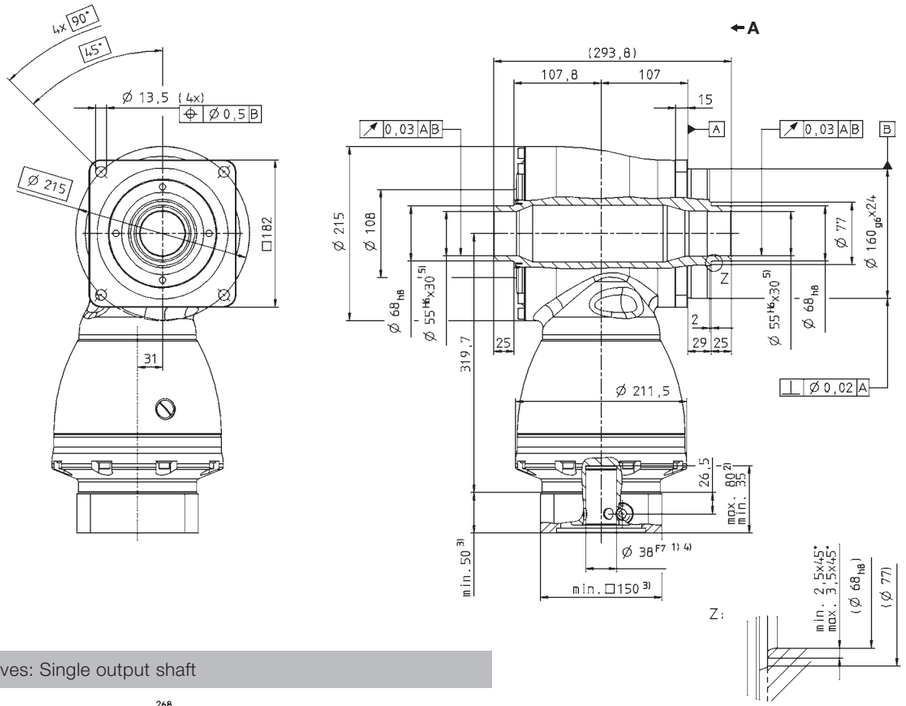
Please contact us for information on the best configuration for S1 conditions of use (continuous operation).

View A

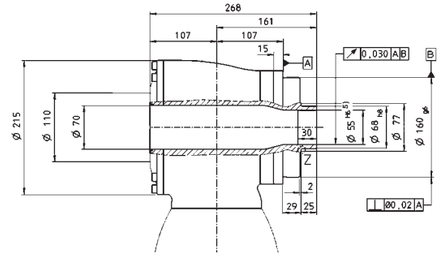
1-stage:



2-stage:



Alternatives: Single output shaft



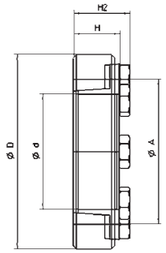
See technical data sheet for available clamping hub diameters (mass moment of inertia). Dimensions available on request.

Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
5) Tolerance h6 for mounted shaft.

⚠ Motor mounting according to operating manual

Machine shaft installation

A shrink disc is used to fit the mounted shaft to the gearhead. The shrink disc is not included in the gearhead scope of delivery and must be ordered as an accessory (see table).



Gearhead type	Shrink disc	AC	d	D	A	H*	H2*	J [kgcm²]
SP⁺ 060 SPK⁺ 060 HG⁺ 060	HSD18-22 HSD18-22 HSD18-22	20000744	18	44	30	15	19	0,393
SP⁺ 075 SPK⁺ 075 HG⁺ 075	HSD24-22 HSD24-22 HSD24-22	20001389	24	50	36	18	22	0,753
SP⁺ 100 SPK⁺ 100 HG⁺ 100	HSD36-22 HSD36-22 HSD36-22	20001391	36	72	52	22	27,3	3,94
SP⁺ 140 SPK⁺ 140 HG⁺ 140	HSD50-22 HSD50-22 HSD50-22	20001394	50	90	68	26	31,3	11,1
SP⁺ 180 SPK⁺ 180 HG⁺ 180	HSD68-22 HSD68-22 HSD68-22	20001396	68	115	86	29	35,4	31,1

* in unclamped state

Gearhead type	Shrink disc	AC	d	D	A	H*	H2*	J [kgcm²]
VDH 050	HSD30-32	20020687	30	60	44	18	20	1,82
VDH 063	HSD36-32	20020688	36	72	52	22	33	3,94
VDH 080	HSD50-32	20020689	50	90	68	26	31,3	11,1
VDH 100	HSD62-32	20020690	62	110	80	29	34,3	27,0

* in unclamped state

One shrink disc per gearhead is sufficient.

Please refer to the operating instructions for information on correct shrink disc installation. The instructions are enclosed with the order.
All shrink discs are also available in stainless steel – please contact WITTENSTEIN alpha.

LK⁺/LPK⁺ – Economical right-angle precision

Economical bevel gears with optional planetary stage

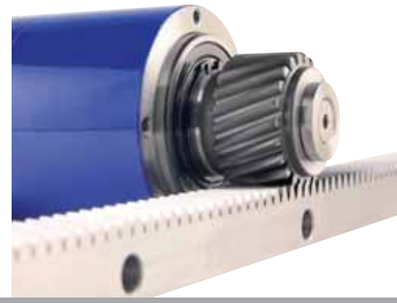
Belt pulley (PLPB)

Couplings

Shrink disc

LPBK⁺: Right-angle gearhead with flange for toothed belt pulleys

Rack / Pinion



LK⁺/LPK⁺

Specifications \ Version	**LK⁺/LPK⁺**		
	+	**++**	**+++**
Positioning accuracy	LK⁺		
	LPK⁺		
Rigidity	LK⁺		
	LPK⁺		
Smooth-running	LK⁺		
	LPK⁺		
Speed capacity		LK⁺	
		LPK⁺	
Power density	LK⁺		
		LPK⁺	
Max. axial/radial forces		LK⁺	
		LPK⁺	

Options

Smooth output shaft (LPK⁺)
Flanged version (LPBK⁺)
Food-grade grease

Accessories

Rack / Pinion (see page 236)
Couplings (see page 268)
Belt pulley (PLPB)
Shrink disc (see page 202)
NEMA flange

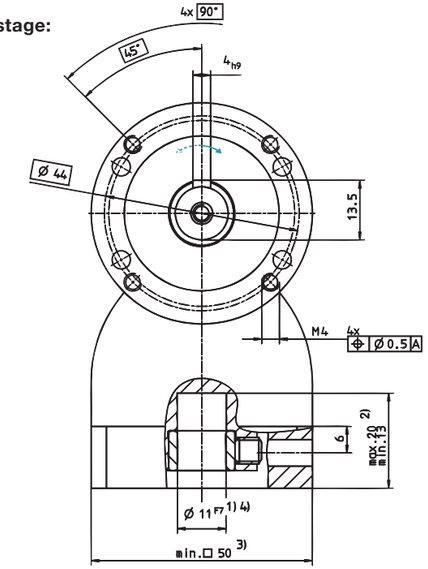
LK+ 050 1-stage

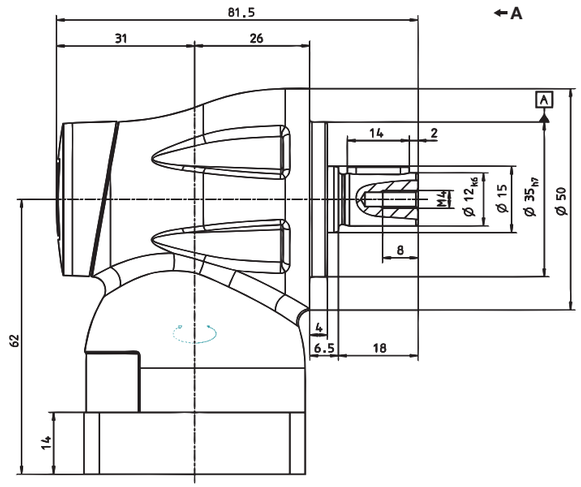
			1-stage
Ratio	i		1
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	2.5
		in.lb	22
Nominal output torque (with n_{2N})	T_{2N}	Nm	1.2
		in.lb	11
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	5
		in.lb	44
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	3200
Max. input speed	n_{1Max}	rpm	5000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	0.2
		in.lb	
Max. torsional backlash	j_t	arcmin	≤ 15
Torsional rigidity	C_{t21}	Nm/ arcmin	–
		in.lb/ arcmin	
Max. axial force [b]	F_{2AMax}	N	100
		lb_f	23
Max. radial force [b]	F_{2RMax}	N	650
		lb_f	146
Efficiency at full load	η	%	95
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000
Weight incl. standard adapter plate	m	kg	0.7
		lb_m	1.5
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–
Max. permitted housing temperature		°C	+90
		F	194
Ambient temperature		°C	0 to +40
		F	32 to 104
Lubrication			Lubricated for life
Paint			without
Direction of rotation			Motor and gearhead same direction
Protection class			IP 64
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	0.14
		10^{-3} in.lb.s²	0.12

[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 1000 rpm

View A

1-stage:





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Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

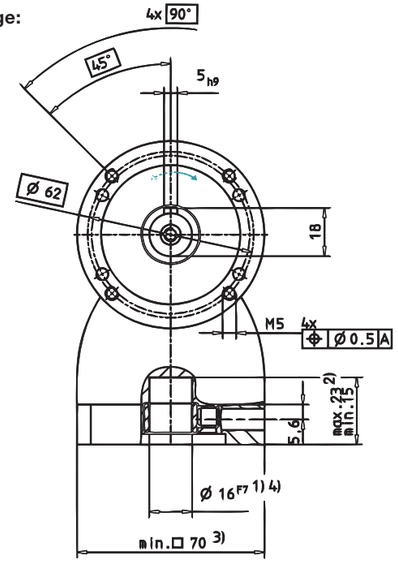
LK+ 070 1-stage

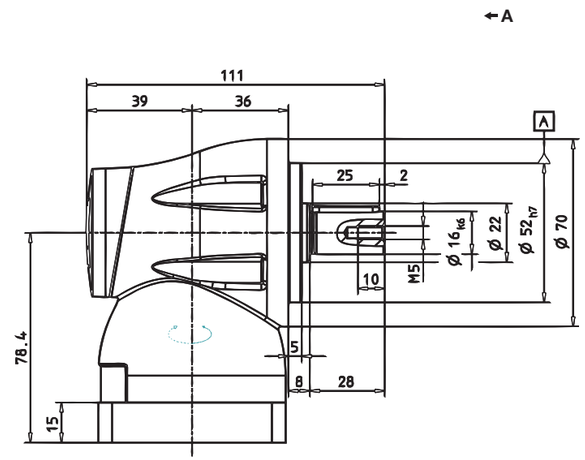
			1-stage
Ratio	i		**1**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	7
		in.lb	62
Nominal output torque (with n_{2N})	T_{2N}	Nm	3.7
		in.lb	33
Emergencye stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	15
		in.lb	133
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	3000
Max. input speed	n_{1Max}	rpm	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	0.4
		in.lb	2.7
Max. torsional backlash	j_t	arcmin	≤ 15
Torsional rigidity	C_{t21}	Nm/ arcmin	–
		in.lb/ arcmin	
Max. axial force [b]	F_{2AMax}	N	200
		lb_f	45
Max. radial force [b]	F_{2RMax}	N	1450
		lb_f	326
Efficiency at full load	η	%	95
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000
Weight incl. standard adapter plate	m	kg	1.9
		lb_m	4.2
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–
Max. permitted housing temperature		°C	+90
		F	194
Ambient temperature		°C	0 to +40
		F	32 to 104
Lubrication			Lubricated for life
Paint			without
Direction of rotation			Motor and gearhead same direction
Protection class			IP 64
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	0.73
		10^{-3} in.lb.s²	0.65

[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 1000 rpm

View A

1-stage:





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Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

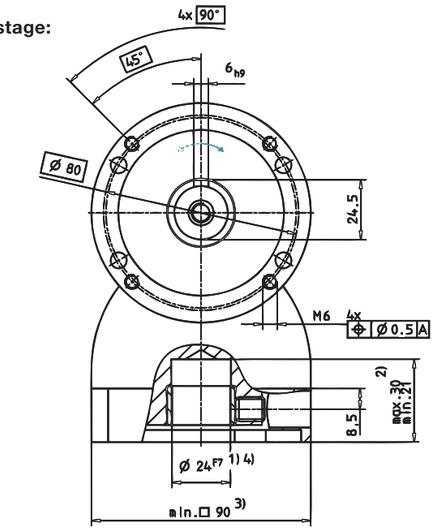
LK+ 090 1-stage

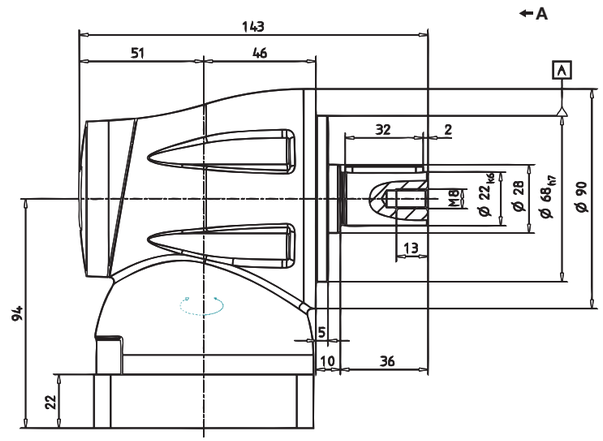
			1-stage
Ratio	i		1
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	19
		in.lb	168
Nominal output torque (with n_{2N})	T_{2N}	Nm	9.3
		in.lb	82
Emergencye stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	37
		in.lb	327
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	2700
Max. input speed	n_{1Max}	rpm	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	0.9
		in.lb	8.0
Max. torsional backlash	j_t	arcmin	≤ 15
Torsional rigidity	C_{t21}	Nm/ arcmin	1.26
		in.lb/ arcmin	11.2
Max. axial force [b]	F_{2AMax}	N	450
		lb_f	101
Max. radial force [b]	F_{2RMax}	N	2400
		lb_f	540
Efficiency at full load	η	%	95
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000
Weight incl. standard adapter plate	m	kg	3.2
		lb_m	7.1
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–
Max. permitted housing temperature		°C	+90
		F	194
Ambient temperature		°C	0 to +40
		F	32 to 104
Lubrication			Lubricated for life
Paint			without
Direction of rotation			Motor and gearhead same direction
Protection class			IP 64
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	3.3
		10^{-3} in.lb.s²	2.9

[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 1000 rpm

View A

1-stage:





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Non-tolerated dimensions ±1 mm
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3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

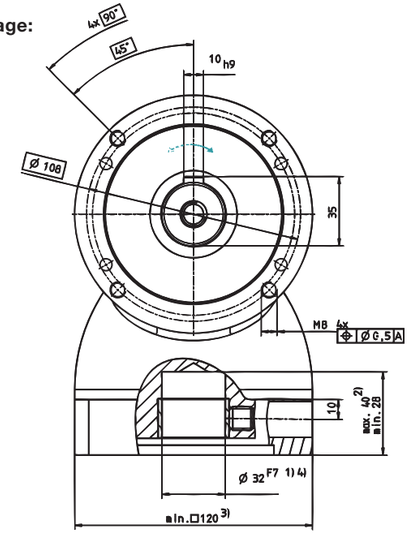
⚠ Motor mounting according to operating manual

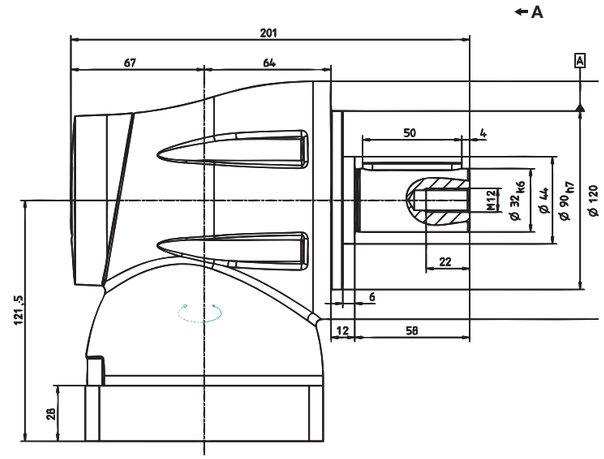
			1-stage
Ratio	i		1
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	45
		in.lb	398
Nominal output torque (with n_{2N})	T_{2N}	Nm	23
		in.lb	204
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	93
		in.lb	823
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	2100
Max. input speed	n_{1Max}	rpm	3500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	2.3
		in.lb	20.4
Max. torsional backlash	j_t	arcmin	≤ 15
Torsional rigidity	C_{t21}	Nm/ arcmin	–
		in.lb/ arcmin	
Max. axial force [b]	F_{2AMax}	N	750
		lb_f	169
Max. radial force [b]	F_{2RMax}	N	4600
		lb_f	1035
Efficiency at full load	η	%	95
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000
Weight incl. standard adapter plate	m	kg	8.9
		lb_m	19.7
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–
Max. permitted housing temperature		°C	+90
		F	194
Ambient temperature		°C	0 to +40
		F	32 to 104
Lubrication			Lubricated for life
Paint			without
Direction of rotation			Motor and gearhead same direction
Protection class			IP 64
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	13.9
		10^{-3} in.lb.s²	12.3

[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 1000 rpm

View A

1-stage:





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4) Smaller motor shaft diameter is compensated by a bushing.

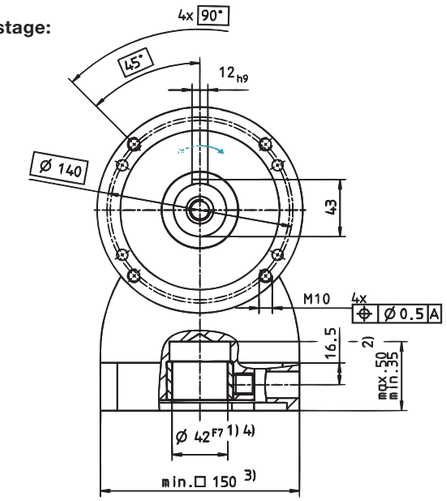
⚠ Motor mounting according to operating manual

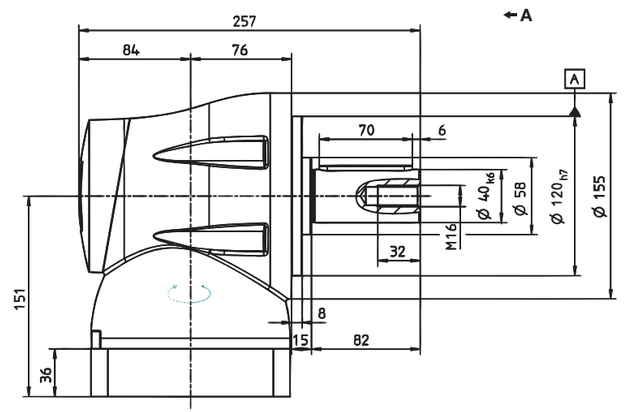
			1-stage
Ratio	i		1
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	93
		in.lb	823
Nominal output torque (with n_{1N})	T_{2N}	Nm	66
		in.lb	584
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	194
		in.lb	1717
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	1600
Max. input speed	n_{1Max}	rpm	3000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	4.5
		in.lb	
Max. torsional backlash	j_t	arcmin	≤ 15
Torsional rigidity	C_{t21}	Nm/ arcmin	–
		in.lb/ arcmin	
Max. axial force [b]	F_{2AMax}	N	1000
		lb_f	225
Max. radial force [b]	F_{2RMax}	N	7500
		lb_f	1688
Efficiency at full load	η	%	95
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000
Weight incl. standard adapter plate	m	kg	18.9
		lb_m	42
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–
Max. permitted housing temperature		°C	+90
		F	194
Ambient temperature		°C	0 to +40
		F	32 to 104
Lubrication			Lubricated for life
Paint			without
Direction of rotation			Motor and gearhead same direction
Protection class			IP 64
Moment of inertia (relates to the drive)	J_1	$kgcm^2$	57.1
		10^{-3} in.lb.s²	50.5

[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 1000 rpm

View A

1-stage:





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Non-tolerated dimensions ±1 mm
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2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

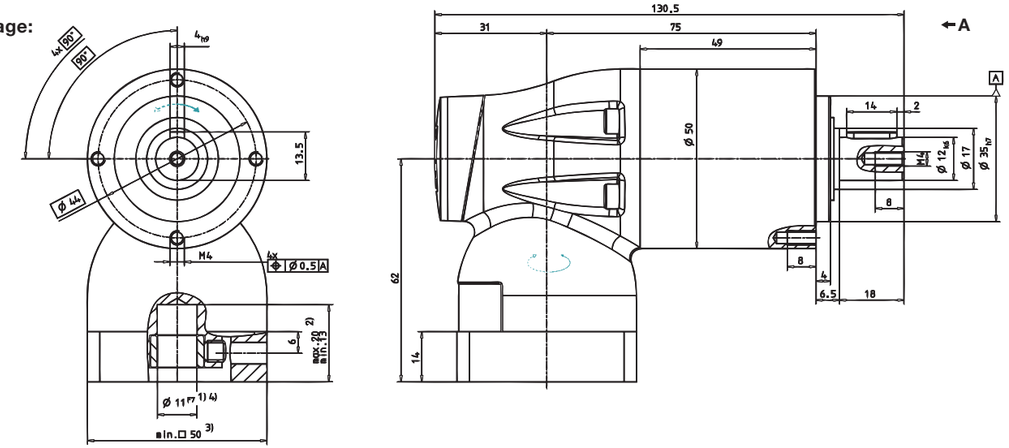
LPK+ 050 2/3-stage

			2-stage				3-stage						
Ratio	i		**4**	**5**	**7**	**10**	**16**	**20**	**25**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	–	12	12	11	–	–	12	12	12	12	11
		in.lb	–	106	106	97	–	–	106	106	106	106	97
Nominal output torque (with n_{2N})	T_{2N}	Nm	–	5.7	5.7	5.2	–	–	5.7	5.7	5.7	5.7	5.2
		in.lb	–	50	50	46	–	–	50	50	50	50	46
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	–	26	26	26	–	–	26	26	26	26	26
		in.lb	–	230	230	230	–	–	230	230	230	230	230
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	–	3200	3200	3200	–	–	3200	3200	3200	3200	3200
Max. input speed	n_{1Max}	rpm	–	5000	5000	5000	–	–	5000	5000	5000	5000	5000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	–	0.2	0.2	0.2	–	–	0.2	0.2	0.2	0.2	0.2
		in.lb	–	1.77	1.77	1.77	–	–	1.77	1.77	1.77	1.77	1.77
Max. torsional backlash	j_t	arcmin	≤ 13				≤ 15						
Torsional rigidity	C_{t21}	Nm/ arcmin	–				–						
		in.lb/ arcmin											
Max. axial force [b]	F_{2AMax}	N	700				700						
		lb_f	158				158						
Max. radial force [b]	F_{2RMax}	N	650				650						
		lb_f	146				146						
Efficiency at full load	η	%	92				90						
Service life (For calculation. see the Chapter “Information”)	L_h	h	> 20000				> 20000						
Weight incl. standard adapter plate	m	kg	1.4				1.6						
		lb_m	3.1				3.5						
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–										
Max. permitted housing temperature		°C	+90										
		F	194										
Ambient temperature		°C	0 to +40										
		F	32 to 104										
Lubrication			Lubricated for life										
Paint			Blue RAL 5002										
Direction of rotation			Motor and gearhead same direction										
Protection class			IP 64										
Moment of inertia (relates to the drive)	J_1	kgcm²	–	0.156	0.156	0.156	–	–	0.156	0.156	0.156	0.156	0.156
		10^{-3} in.lb.s²	–	0.138	0.138	0.138	–	–	0.138	0.138	0.138	0.138	0.138

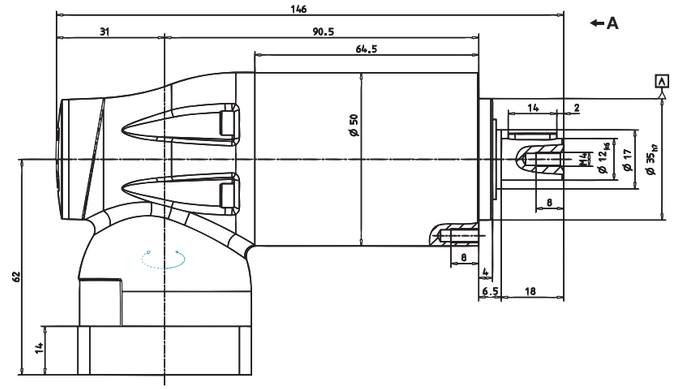
[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 100 rpm

View A

2-stage:



3-stage:



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
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3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

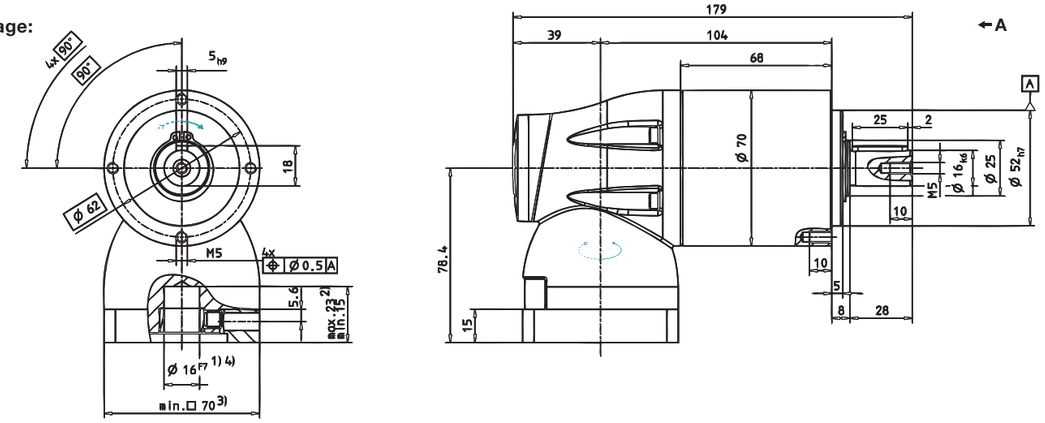
LPK+ 070 2/3-stage

			2-stage					3-stage								
Ratio	i		**3**	**4**	**5**	**7**	**10**	**15**	**16**	**20**	**25**	**30**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	22	29	35	35	32	32	35	35	35	32	35	35	35	32
		in.lb	195	257	310	310	283	283	310	310	310	283	310	310	310	283
Nominal output torque (with n_{2N})	T_{2N}	Nm	11	15	18	18	16.5	16.5	18	18	18	16.5	18	18	18	16.5
		in.lb	97	133	159	159	146	146	159	159	159	146	159	159	159	146
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	45	60	75	75	75	75	75	75	75	75	75	75	75	75
		in.lb	398	531	664	664	664	664	664	664	664	664	664	664	664	664
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Max. input speed	n_{1Max}	rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	0.6	0.55	0.5	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.4
		in.lb	5.3	4.9	4.4	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.5
Max. torsional backlash	j_t	arcmin	≤ 11					≤ 13								
Torsional rigidity	C_{t21}	Nm/ arcmin	-	-	2	2	2	3	3	3	3	3	3	3	3	3
		in.lb/ arcmin	-	-	17	21	21	23	27	27	27	25	27	28	28	25
Max. axial force [b]	F_{2AMax}	N	1550					1550								
		lb_f	349					349								
Max. radial force [b]	F_{2RMax}	N	1450					1450								
		lb_f	326					326								
Efficiency at full load	η	%	92					90								
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000					> 20000								
Weight incl. standardadapter plate	m	kg	3.8					4.2								
		lb_m	8.4					9.3								
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead same direction													
Protection class			IP 64													
Moment of inertia (relates to the drive)	J_1	kgcm²	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
		10^{-3} in.lb.s²	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

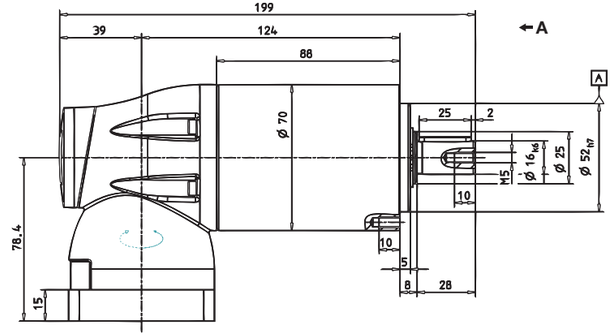
[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 100 rpm

View A

2-stage:



3-stage:



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3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

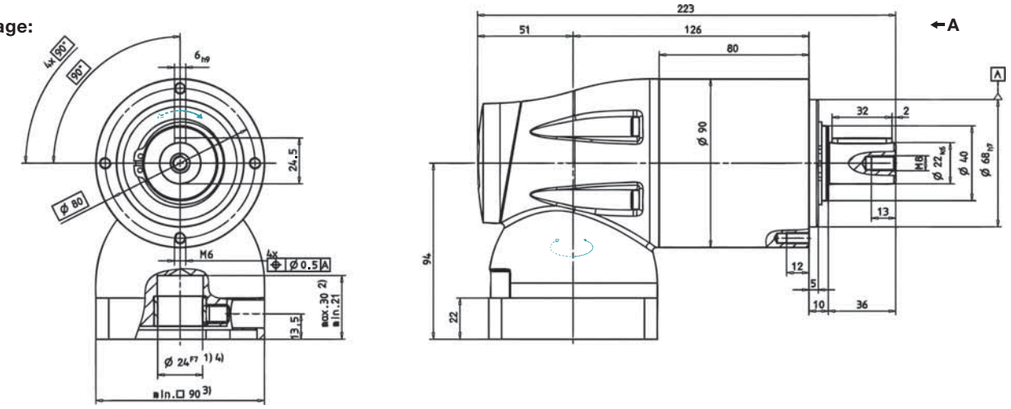
LPK+ 090 2/3-stage

			2-stage					3-stage								
Ratio	i		**3**	**4**	**5**	**7**	**10**	**15**	**16**	**20**	**25**	**30**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	56	74	90	90	80	80	90	90	90	80	90	90	90	80
		in.lb	496	655	797	797	708	708	797	797	797	708	797	797	797	708
Nominal output torque (with n_{2N})	T_{2N}	Nm	28	37	45	45	40	40	45	45	45	40	45	45	45	40
		in.lb	248	327	398	398	354	354	398	398	398	354	398	398	398	354
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	110	150	190	190	190	190	190	190	190	190	190	190	190	190
		in.lb	974	1328	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700
Max. input speed	n_{1Max}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	1.3	1.3	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0
		in.lb	12	11	11	10	10	10	10	10	10	10	10	10	10	9
Max. torsional backlash	j_t	arcmin	≤ 11					≤ 13								
Torsional rigidity	C_{t21}	Nm/ arcmin	4.9	6.5	7.3	8.2	8.0	8.3	9.2	9.4	9.4	8.4	9.5	9.5	9.5	8.5
		in.lb/ arcmin	43	58	65	73	71	73	81	83	83	74	84	84	84	75
Max. axial force [b]	F_{2AMax}	N	1900					1900								
		lb_f	428					428								
Max. radial force [b]	F_{2RMax}	N	2400					2400								
		lb_f	540					540								
Efficiency at full load	η	%	92					90								
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000					> 20000								
Weight incl. standard adapter plate	m	kg	6.9					7.9								
		lb_m	15.2					17.5								
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead same direction													
Protection class			IP 64													
Moment of inertia (relates to the drive)	J_1	kgcm²	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
		10^{-3} in.lb.s²	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6

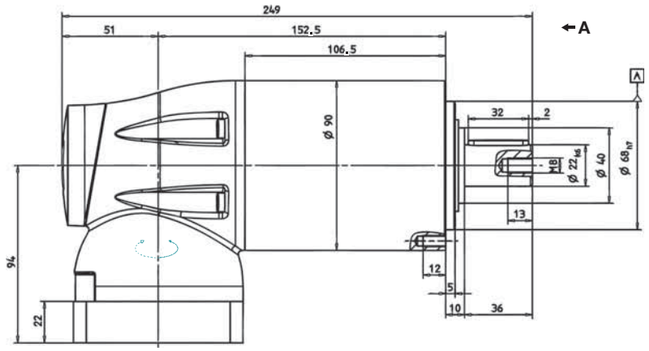
[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 100 rpm

View A

2-stage:



3-stage:



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

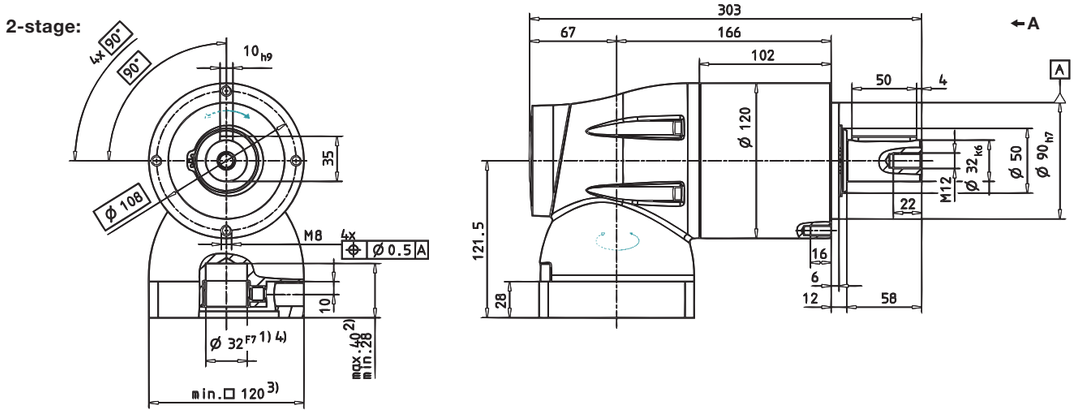
LPK+ 120 2/3-stage

			2-stage					3-stage								
Ratio	i		**3**	**4**	**5**	**7**	**10**	**15**	**16**	**20**	**25**	**30**	**35**	**50**	**70**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	136	181	220	220	200	200	220	220	220	200	220	220	220	200
		in.lb	1204	1602	1947	1947	1770	1770	1947	1947	1947	1770	1947	1947	1947	1770
Nominal output torque (with n_{2N})	T_{2N}	Nm	68	91	110	110	100	100	110	110	110	100	110	110	110	100
		in.lb	602	805	974	974	885	885	974	974	974	885	974	974	974	885
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	280	380	480	480	480	480	480	480	480	480	480	480	480	480
		in.lb	2478	3363	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Max. input speed	n_{1Max}	rpm	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	3.5	3.3	3.2	3.1	3.1	2.9	2.9	2.8	2.8	2.7	2.7	2.7	2.7	2.7
		in.lb	31	29	28	27	27	26	26	25	25	24	24	24	24	24
Max. torsional backlash	j_t	arcmin	≤ 11					≤ 13								
Torsional rigidity	C_{t21}	Nm/ arcmin	18.7	21.5	23.3	24.1	21.7	21.8	24.8	24.8	24.9	22.0	25.0	25.0	25.0	22.0
		in.lb/ arcmin	165.5	190.3	206.2	213.3	192.0	192.9	219.5	219.5	220.4	194.7	221.3	221.3	221.3	194.7
Max. axial force [b]	F_{2AMax}	N	4000					4000								
		lb_f	900					900								
Max. radial force [b]	F_{2RMax}	N	4600					4600								
		lb_f	1035					1035								
Efficiency at full load	η	%	92					90								
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000					> 20000								
Weight incl. standard adapter plate	m	kg	16.8					19.2								
		lb_m	37.1					42.4								
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–													
Max. permitted housing temperature		°C	+90													
		F	194													
Ambient temperature		°C	0 to +40													
		F	32 to 104													
Lubrication			Lubricated for life													
Paint			Blue RAL 5002													
Direction of rotation			Motor and gearhead same direction													
Protection class			IP 64													
Moment of inertia (relates to the drive)	J_1	kgcm²	16.6	16.6	16.6	16.6	16.6	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
		10^{-3} in.lb.s²	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7

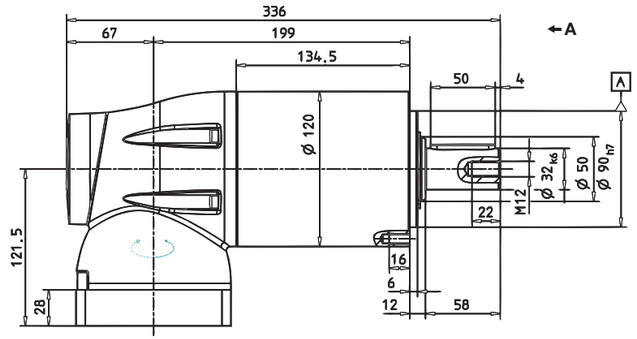
[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if n_2 = 100 rpm

View A

2-stage:



3-stage:



Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

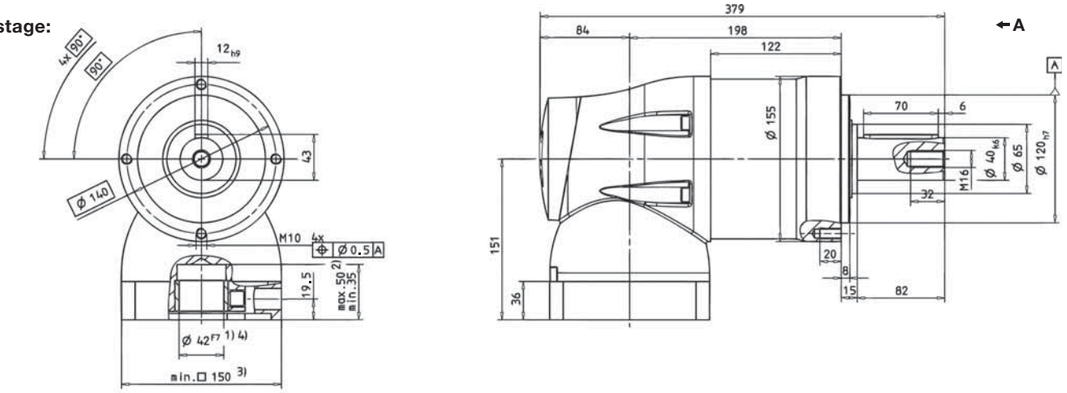
LPK+ 155 2/3-stage

			2-stage		3-stage		
Ratio	i		**5**	**10**	**25**	**50**	**100**
Max. acceleration torque (max. 1000 cycles per hour)	T_{2B}	Nm	450	350	450	450	350
		in.lb	3983	3098	3983	3983	3098
Nominal output torque (with n_{2N})	T_{2N}	Nm	320	190	320	320	190
		in.lb	2832	1682	2832	2832	1682
Emergency stop torque (permitted 1000 times during the service life of the gearhead)	T_{2Not}	Nm	1000	1000	1000	1000	1000
		in.lb	8850	8850	8850	8850	8850
Nominal input speed (with T_{2N} and 20°C ambient temperature) [a]	n_{1N}	rpm	1600	1600	1600	1600	1600
Max. input speed	n_{1Max}	rpm	3000	3000	3500	3500	3500
Mean no load running torque (with n_1 = 3000 rpm and 20°C gearhead temperature)	T_{012}	Nm	–	–	–	–	–
		in.lb					
Max. torsional backlash	j_t	arcmin	≤ 11		≤ 13		
Torsional rigidity	C_{t21}	Nm/ arcmin	44.2	41.9	54.5	54.9	44
		in.lb/ arcmin	391	371	482	486	389
Max. axial force [b]	F_{2AMax}	N	6000		6000		
		lb_f	1350		1350		
Max. radial force [b]	F_{2RMax}	N	7500		7500		
		lb_f	1688		1688		
Efficiency at full load	η	%	92		90		
Service life (For calculation, see the Chapter “Information”)	L_h	h	> 20000		> 20000		
Weight incl. standard adapter plate	m	kg	34.7		38.7		
		lb_m	76.7		85.5		
Operating noise (with n_1 = 3000 rpm no load)	L_{PA}	dB(A)	–				
Max. permitted housing temperature		°C	+90				
		F	194				
Ambient temperature		°C	0 to +40				
		F	32 to 104				
Lubrication			Lubricated for life				
Paint			Blue RAL 5002				
Direction of rotation			Motor and gearhead same direction				
Protection class			IP 64				
Moment of inertia (relates to the drive)	J_1	kgcm²	75.1	75.1	16.8	16.8	16.8
		10^{-3} in.lb.s²	66.5	66.5	14.8	14.8	14.8

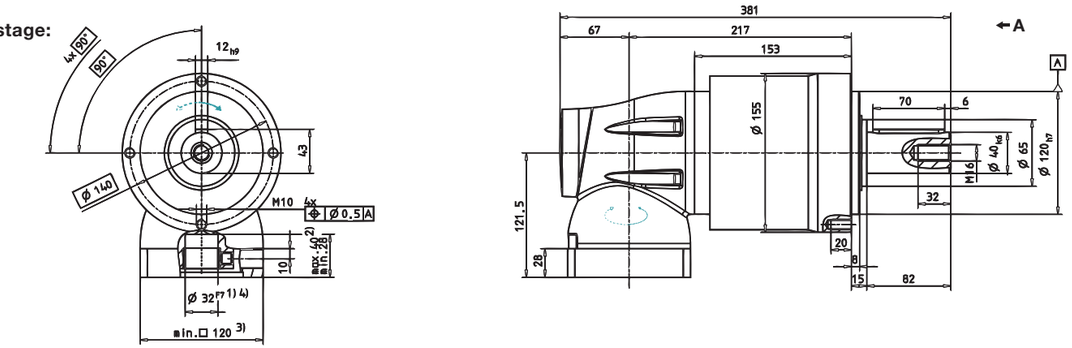
[a] For higher ambient temperatures, please reduce input speed
[b] Refers to center of the output shaft, if = 100 rpm

View A

2-stage:



3-stage:

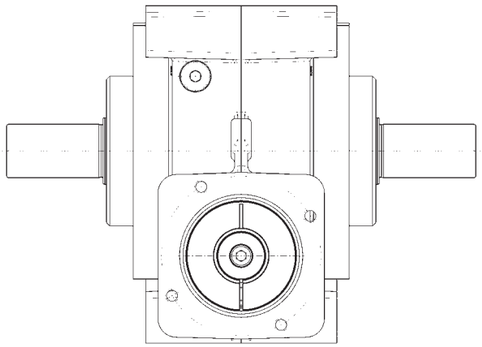


Non-tolerated dimensions ±1 mm
1) Check motor shaft fit.
2) Min./Max. permissible motor shaft length. Longer motor shafts are adaptable, please contact us.
3) The dimensions depend on the motor.
4) Smaller motor shaft diameter is compensated by a bushing.

⚠ Motor mounting according to operating manual

V-DRIVE® – Low backlash servo worm gearhead

The servo worm gearhead with solid shaft, hollow shaft and hollow shaft flange outputs



Shaft on both sides

Shrink disc

Couplings

Rack / Pinion

V-DRIVE®

Specifications \ Version	VDS/VDT/VDH		
	+	++	+++
Positioning accuracy			
Rigidity		VDT VDS/VDH	
Smooth-running			
Speed capacity			
Power density			
Max. axial/radial forces			

Options

VDS, VDH, VDT version
Washdown version
Food-grade grease
Shaft on both sides Shaft on both sides
i > 40 (on request)

Accessories

Rack / Pinion (see page 236)
Shrink disc (see page 202)
Couplings (see page 268)

VDT, VDH, VDS

Technical data

Size				050		063		080		100	
Max. acceleration torque (n_1=3000 rpm) [a]	T_{2B} Nm (in.lb)		i=4	59	(523)	138	(1222)	247	(2186)	420	(3717)
			i=7	77	(682)	176	(1558)	320	(2832)	551	(4877)
			i=10	81	(717)	194	(1717)	319	(2824)	606	(5364)
			i=16	88	(779)	209	(1850)	381	(3372)	629	(5567)
			i=28	97	(859)	224	(1983)	413	(3656)	718	(6355)
			i=40	81	(717)	217	(1921)	362	(3204)	692	(6125)
Nominal output torque (n_1=3000 rpm) [a]	T_{2N} Nm (in.lb)		i=4	43	(381)	87	(770)	155	(1372)	261	(2310)
			i=7	56	(496)	124	(1098)	224	(1983)	384	(3399)
			i=10	59	(523)	141	(1248)	233	(2063)	443	(3921)
			i=16	64	(567)	152	(1346)	278	(2461)	459	(4063)
			i=28	71	(629)	165	(1461)	301	(2664)	524	(4638)
			i=40	59	(523)	159	(1408)	264	(2337)	505	(4470)
Max. input speed	n_{1Max} rpm			6000		4500		4000		3000	
Nominal speed	n_{1N} rpm			4000		4000		3500		3000	
Ratios	i			4, 7, 10, 16, 28, 40							
Torsional backlash	j_t arcmin			< 3		< 3		< 3		< 3	
Torsional rigidity	C_{t21} Nm/arcmin (in.lb/arcmin)	VDT	i=40	17	(150)	50	(442)	113	(1000)	213	(1885)
		VDH	i=40	8	(70)	28	(247)	78	(690)	153	(1354)
		VDS	i=40	8	(70)	28	(247)	78	(690)	153	(1354)
Max. axial force	F_{2AMax} N (lbf)			5000	(1125)	8250	(1855)	13900	(3125)	19500	(4384)
Max. radial force	F_{2RMax} N (lbf)			3800	(855)	6000	(1349)	9000	(2024)	14000	(3148)
Max. tilting moment	M_{2KMax} Nm (in.lb)			409	(3620)	843	(7461)	1544	(13664)	3059	(27072)
Tilting rigidity	C_{2k} Nm/arcmin (in.lb/arcmin)	VDT		504	(4460)	603	(5337)	1178	(10425)	2309	(20435)
idling torque (n_1=3000 rpm)	T_{012} Nm (in.lb)		i=4	1.28	(11)	2.07	(18)	3.63	(32)	9.75	(86)
			i=7	1.23	(10)	1.9	(16)	3.48	(30)	8.06	(71)
			i=10	1.18	(10)	1.83	(16)	3.37	(29)	7.41	(65)
			i=16	1.09	(9.7)	1.73	(15)	3.15	(27)	6.72	(59)
			i=28	0.98	(8.7)	1.6	(14)	3	(26)	5.79	(51)
			i=40	0.89	(7.9)	1.44	(12)	2.76	(24)	4.99	(44)
Service life	L_h h			> 20000							
Efficiency [a] (n_1=3000 rpm)	η %		i=4	96		96		97		97	
			i=7	94		95		96		96	
			i=10	93		94		94		95	
			i=16	90		91		92		92	
			i=28	83		85		86		87	
			i=40	78		81		81		84	
Weight (without motor attachment parts)	m kg (lb)	VDT		8	(17)	16	(35)	30	(66)	64	(141)
		VDH		7	(15)	13	(28)	25	(55)	47	(103)
		VDS		8	(17)	14	(30)	27	(59)	57	(125)
Lubrication				Synthetic transmission oil							
Paint				None							
Permissible gearhead temperature	°C (°F)			-10 to +90 (14 to 194)							
Direction of rotation				See drawings							
Protection class				IP 64							
Operating noise (n_1=3000 rpm)	L_{PA} dB(A)			≤ 62		≤ 64		≤ 66		≤ 70	

[a] See the dimensioning factors in the Chapter “Information”.

Moments of inertia J_1 [kgcm²] (10^{-3} in.lb.s²) relating to the drive

Size	i	VDT	VDH	VDS
050	4	1.27 (1.12)	1.00 (0.89)	0.97 (0.86)
	7	0.75 (0.66)	0.65 (0.58)	0.65 (0.58)
	10	0.65 (0.58)	0.60 (0.53)	0.59 (0.52)
	16	0.59 (0.52)	0.57 (0.50)	0.57 (0.50)
	28	0.55 (0.49)	0.55 (0.49)	0.55 (0.49)
	40	0.61 (0.54)	0.61 (0.54)	0.61 (0.54)

Size	i	VDT	VDH	VDS
063	4	3.73 (3.30)	3.03 (2.68)	3.03 (2.68)
	7	2.43 (2.15)	2.13 (1.89)	2.23 (1.97)
	10	2.03 (1.80)	1.93 (1.71)	1.93 (1.71)
	16	1.93 (1.71)	1.83 (1.62)	1.83 (1.62)
	28	1.80 (1.59)	1.79 (1.58)	1.79 (1.58)
	40	1.79 (1.58)	1.78 (1.58)	1.79 (1.58)

Size	i	VDT	VDH	VDS
080	4	13.40 (11.86)	9.52 (8.43)	10.72 (9.49)
	7	8.32 (7.36)	7.32 (6.48)	7.42 (6.57)
	10	8.02 (7.10)	7.62 (6.74)	7.62 (6.74)
	16	6.52 (5.77)	6.32 (5.59)	6.32 (5.59)
	28	6.12 (5.42)	6.12 (5.42)	6.12 (5.42)
	40	7.02 (6.21)	7.02 (6.21)	7.02 (6.21)

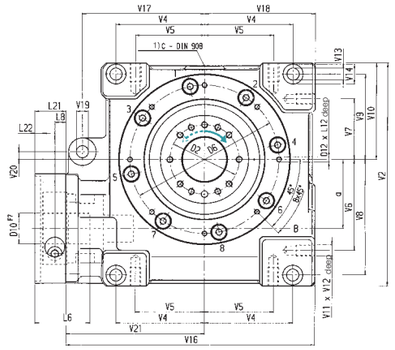
Size	i	VDT	VDH	VDS
100	4	62.40 (55.23)	49.60 (43.90)	49.50 (43.81)
	7	44.70 (39.56)	40.60 (35.93)	40.50 (35.85)
	10	40.30 (35.67)	38.40 (33.99)	38.40 (33.99)
	16	40.70 (36.02)	39.90 (35.31)	39.90 (35.31)
	28	37.00 (32.75)	36.70 (32.48)	36.70 (32.48)
	40	38.70 (34.25)	38.60 (34.16)	38.60 (34.16)

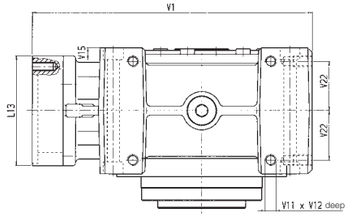
VDT version

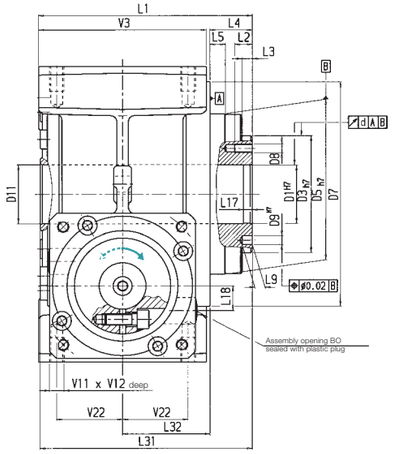
Dimensions [mm]

Size	050	063	080	100
a	50	63	80	100
d	0.03	0.03	0.03	0.04
c	G 1/2	G 1/2	G 3/4	G 1
B0	15	18	20	20
D1 H7	31.5	40	50	80
D2	50	63	80	125
D3 h7	63	80	100	160
D5 h7	90	110	140	200
D6	109	135	168	233
D7	124	154	202	257
D8	M6	M6	M8	M10
D9 H7	6	6	8	10
D10 F7	19	28	35	48
D11	30	40.5	50.5	70
D12	M5	M5	M6	M8
L1	132.5	146.5	190.5	247.5
L2	10	12	15	20
L3	7	7	7	9
L4	30	29	38	50
L5	10	10.5	12.5	15.5
L6 min./max. [a]	23/40	30/50	32/60	45/82
L8	8.5	10	12.5	13
L9	7	7	7	10
L12	8.5	8.5	12	15.5
□ L13 [a]	80	100	140	190
L17	6	6	6	8
L18	12	17	19	29
L21 [a]	22	28	30.5	37.5
L22 [a]	6.7	7.2	5.7	9.8
L31	132.5	145.5	190.5	246.5
L32	52.5	60	77.5	100
V1 [a]	220	253.5	325	402.5
V2	162.5	203	260	335
V3	100	115	150	195
V4	70	80	110	132.5
V5	52.5	62.5	90	110
V6	65	83	115	157.5
V7	42.5	55	70	97.5
V8	82.5	105.5	142.5	185
V9	60	77.5	97.5	125
V10	70	87.5	107.5	137.5
V11	M8	M10	M12	M12
V12	13.5	17	19.5	19.5
V13	11	11	11	14
V14	18	18	18	20
V15	11	11	11	13
V16	198	225.5	294.5	365
V17	98	110.5	152	194
V18	85	100	127.5	152.5
V19	11	11	11	14
V20	10	7	10	20
V21	113	125.5	167	212.5
V22	40	45	60	82.5

[a] The dimensions depend on the motor



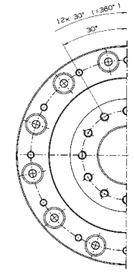




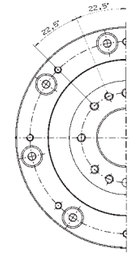
Identical arrows indicate dependence on the direction of rotation.

[1] Oil filler and drain plug

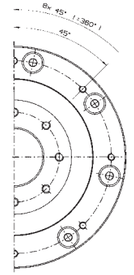
VDT 080/100

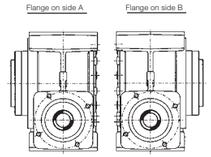


VDT 063



VDT 050





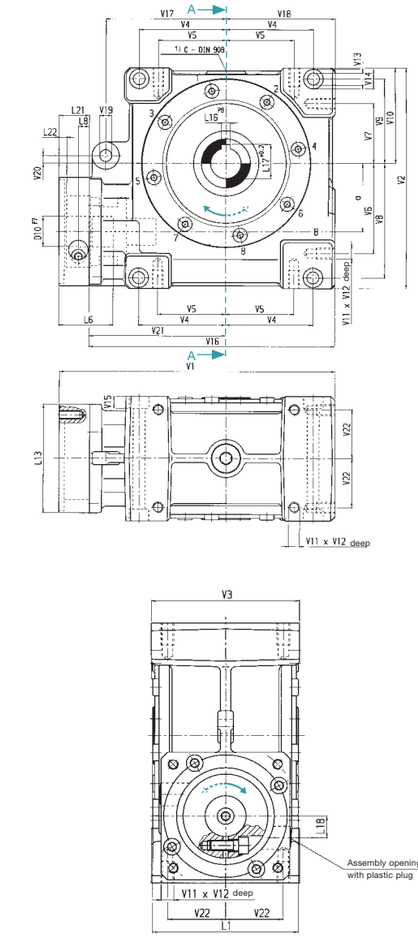
V-DRIVE®

VDH version Hollow shaft, keywayed

Dimensions [mm]

Size	050	063	080	100
a	50	63	80	100
c	G 1/2	G 1/2	G 3/4	G 1
B0	15	18	20	20
D1 H6	25	28	36	48
D2	25.5	28.5	36.5	49
D7	M12	M12	M16	M20
D8	M10	M10	M12	M16
D10 F7	19	28	35	48
L1	100	113	150	193
L3	50	56.5	75	96.5
L4	30	37.5	45	64
L6 min./max. [a]	23/40	30/50	32/60	45/82
L8	8.5	10	12.5	13
□ L13 [a]	80	100	140	190
L16 P8	8	8	10	14
L17	28.3	31.3	39.3	51.8
L18	12	17	19	29
L21 [a]	22	28	30.5	37.5
L22 [a]	6.7	7.2	5.7	9.8
L30	84.5	97.2	130	169.9
L31 max [b]	77	89	119	159
L32	7	8	10	11
V1 [a]	220	253.5	325	402.5
V2	162.5	203	260	335
V3	100	115	150	195
V4	70	80	110	132.5
V5	52.5	62.5	90	110
V6	65	83	115	157.5
V7	42.5	55	70	97.5
V8	82.5	105.5	142.5	185
V9	60	77.5	97.5	125
V10	70	87.5	107.5	137.5
V11	M8	M10	M12	M12
V12	13.5	17	19.5	19.5
V13	11	11	11	14
V14	18	18	18	20
V15	11	11	11	13
V16	198	225.5	294.5	365
V17	98	110.5	152	194
V18	85	100	127.5	152.5
V19	11	11	11	14
V20	10	7	10	20
V21	113	125.5	167	212.5
V22	40	45	60	82.5

[a] The dimensions depend on the motor
[b] Only valid when forcing disc is used



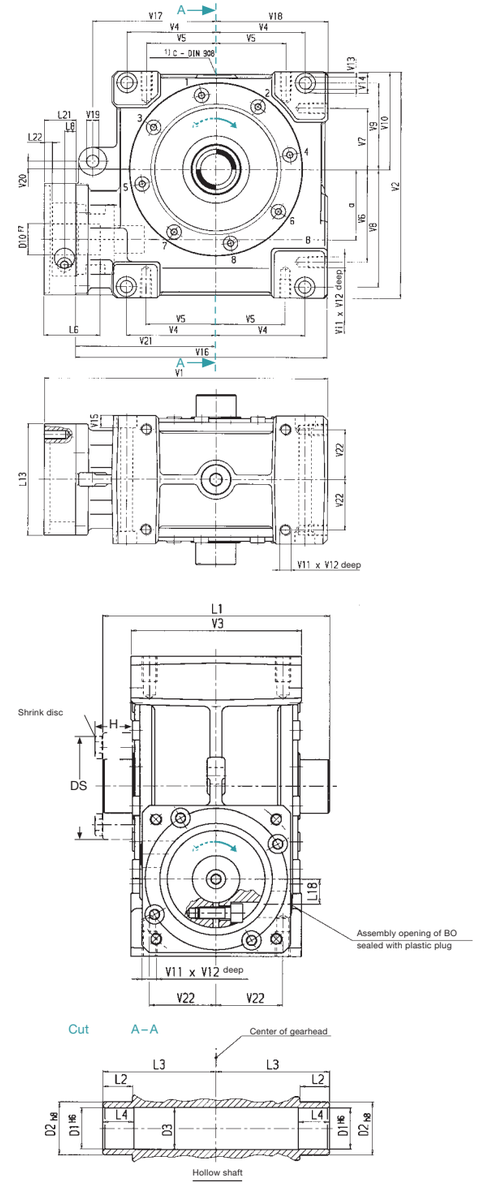
Identical arrows indicate dependence on the direction of rotation.
[1] Oil filler and drain plug
[2] not included in the scope of delivery
Tolerance h6 for mounted shaft.

VDH version Hollow shaft, smooth

Dimensions [mm]

Size	050	063	080	100
a	50	63	80	100
c	G 1/2	G 1/2	G 3/4	G 1
B0	15	18	20	20
D1 H6	25	28	36	48
D2 h8	30	36	50	62
D3	25.5	28.5	36.5	49
D10 F7	19	28	35	48
DS	60	72	90	110
H	24	27.5	31.5	34.5
L1	137	153	200	253
L2	18.5	20	25	25
L3	68.5	76.5	100	126.5
L4	20	21	26	28
L6 min./max. [a]	23/40	30/50	32/60	45/82
L8	8.5	10	12.5	13
□ L13 [a]	80	100	140	190
L18	12	17	19	29
L21 [a]	22	28	30.5	37.5
L22 [a]	6.7	7.2	5.78	9.8
V1 [a]	220	253.5	325	402.5
V2	162.5	203	260	335
V3	100	115	150	195
V4	70	80	110	132.5
V5	52.5	62.5	90	110
V6	65	83	115	157.5
V7	42.5	55	70	97.5
V8	82.5	105.5	142.5	185
V9	60	77.5	97.5	125
V10	70	87.5	107.5	137.5
V11	M8	M10	M12	M12
V12	13.5	17	19.5	19.5
V13	11	11	11	14
V14	18	18	18	20
V15	11	11	11	13
V16	198	225.5	294.5	365
V17	98	110.5	152	194
V18	85	100	127.5	152.5
V19	11	11	11	14
V20	10	7	10	20
V21	113	125.5	167	212.5
V22	40	45	60	82.5

[a] The dimensions depend on the motor



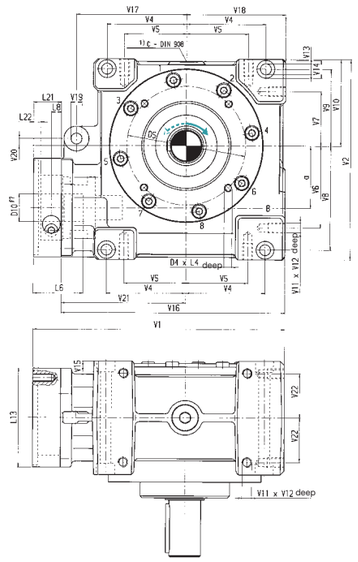
Identical arrows indicate dependence on the direction of rotation.
[1] Oil filler and drain plug
Tolerance h6 for mounted shaft.

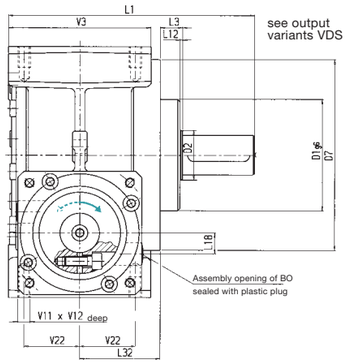
VDS version

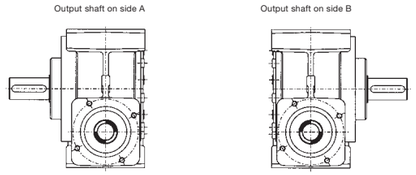
Dimensions [mm]

Size	050	063	080	100
a	50	63	80	100
c	G 1/2	G 1/2	G 3/4	G 1
B0	15	18	20	20
D1 g6	70	90	130	160
D2	30	40	55	65
D4	M6	M8	M10	M12
D5	85	120	165	215
D7	124	154	202	257
D10 F7	19	28	35	48
L1 smooth/keywayed	156	198.5	265	306.5
L1 involute	146	166.5	223	266
L3	14	18	23	27
L4	10	13	15	23
L6 min./max. [a]	23/40	30/50	32/60	45/82
L8	8.5	10	12.5	13
L12	2	2	3	3
□ L13 [a]	80	100	140	190
L18	12	17	19	29
L21 [a]	22	28	30.5	37.5
L22 [a]	6.7	7.2	5.7	9.8
L32	56	65	85	100
V1 [a]	220	253.5	325	402.5
V2	162.5	203	260	335
V3	100	115	150	195
V4	70	80	110	132.5
V5	52.5	62.5	90	110
V6	65	83	115	157.5
V7	42.5	55	70	97.5
V8	82.5	105.5	142.5	185
V9	60	77.5	97.5	125
V10	70	87.5	107.5	137.5
V11	M8	M10	M12	M12
V12	13.5	17	19.5	19.5
V13	11	11	11	14
V14	18	18	18	20
V15	11	11	11	13
V16	198	225.5	294.5	365
V17	98	110.5	152	194
V18	85	100	127.5	152.5
V19	11	11	11	14
V20	10	7	10	20
V21	113	125.5	167	212.5
V22	40	45	60	82.5

[a] The dimensions depend on the motor







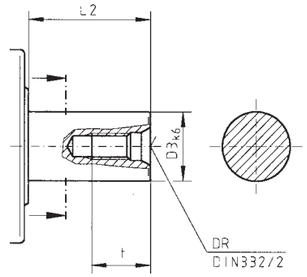
Identical arrows indicate dependence on the direction of rotation.

[1] Oil filler and drain plug

Output variants VDS

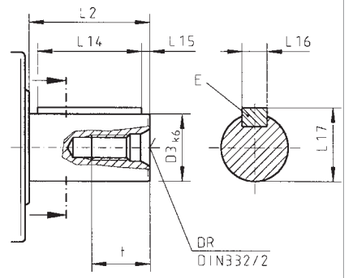
Smooth output shaft [mm]

Size		VDS 050	VDS 063	VDS 080	VDS 100
Output shaft dia.	D3 k6	22	32	40	55
Centering bore hole	DR	M8	M12	M16	M20
Output shaft length	L2	36	58	82	82
Thread depth, centering bore hole	t	19	28	36	42



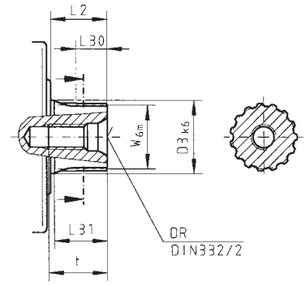
Keywayed output shaft [mm]

Size		VDS 050	VDS 063	VDS 080	VDS 100
Output shaft dia.	D3 k6	22	32	40	55
Centering bore hole	DR	M8	M12	M16	M20
Key	E	Key as per DIN 6885, sheet 1, form A			
Output shaft length	L2	36	58	82	82
Key length	L14	32	50	70	70
Position of key	L15	2	4	5	6
Key width	L16 h9	6	10	12	16
Output shaft with key	L17	24.5	35	43	59
Thread depth, centering bore hole	t	19	28	36	42



Output shaft with **involute gearing** as per DIN 5480 [mm]

Size		VDS 050	VDS 063	VDS 080	VDS 100
Designation as per DIN 5480		22 x 1.25 x 30 x 16 x 6m	32 x 1.25 x 30 x 24 x 6m	40 x 2 x 30 x 18 x 6m	55 x 2 x 30 x 26 x 6m
Output shaft dia.	D3 k6	22	32	40	55
Centering bore hole	DR	M8	M12	M16	M20
Lead angle		30°	30°	30°	30°
Output shaft length	L2	26	26	40	41.5
Effective length, involute	L30	15	15	20	21.5
Involute length	L31	22.5	23	32	33.5
Module	m	1.25	1.25	2	2
Thread depth	t	19	28	36	42
Shaft to DIN 5480	W 6m	22	32	40	55
Number of teeth	z	16	24	18	26
Fit combination 7H/6m yields the following face clearances:					
min. face clearance	$j_{t\,min}$	-0.027	-0.033	-0.033	-0.037
max. face clearance	$j_{t\,max}$	0.021	0.028	0.028	0.031
With $j_{t\,min}$, the pinion must be heated to approx. +80°C.					



We recommend using smooth output shafts during reverse operation and with high gearhead loads.

Putting you one step ahead of the rest: Mechanical systems by WITTENSTEIN alpha

More precise, more individual, more compact – mechanical systems by WITTENSTEIN alpha and numerous special applications have opened up a whole new range of possibilities. Maximizing performance. Achieving more. Progressing faster. Solution-oriented, individualized systems, compatible with all WITTENSTEIN alpha gearheads: alpha Rack & Pinion System, alpha IQ and couplings by WITTENSTEIN alpha.
Optimizing your company's plans for the future.

alpha Rack & Pinion System

alpha IQ

Couplings

Mechanical systems

alpha Rack & Pinion System

Recognizing individuality. Benefiting from experience. Achieving harmony.
We are more than familiar with the combination of gearhead, motor and pinion. We are adding extra depth to our experience by developing mechanical systems with an outstanding capacity for integration. For maximum machine efficiency. Outstanding dynamics. Compact dimensions. Individual solutions that help bring you one step closer to achieving your ambitious goals.

alpha IQ

Achieving compatibility. Utilizing intelligence. Increasing efficiency.
A gearhead and measuring instrument in one system, fully compatible with all WITTENSTEIN alpha gearheads, continuous realtime data acquisition during operation – alpha IQ, the intelligent planetary gearhead. For continuous data acquisition and drive component monitoring, for increasing productivity and process stability. Innovative engineers are not the only ones getting excited about this system. Operating companies will have something to write home about too.

Couplings

Redefining movement. Refining transmission processes. Crossing boundaries.
For WITTENSTEIN alpha couplings, freedom of innovation means: A maximum acceleration torque of 10,000 Nm, disengagement within 1–3 ms and a belt tension of 100 to 12,000 N combined with absolute torsional rigidity, simple installation, a self-adjustment function and no maintenance. High-tech components for the harmonious transmission of power and movement – in all applications where improved performance means forward progress.

alpha Rack & Pinion System – a perfect combination of gearhead, pinion and rack – ranging from low-cost to high-end systems

alpha Rack & Pinion Systems

Details

alpha Rack & Pinion System –
a **perfect symbiosis** of **state-of-the-art technology** and **many years of experience**.
alpha is the next generation of rack and pinion systems. Our specialist knowledge extends from the separate coupling of gearhead, motor, pinion and rack to complete system solutions.

The alternative – not only for long distances

Rack and pinion combinations do not only excel in applications involving long, precise movement paths.
The WITTENSTEIN alpha technology achieves an excellent degree of precision using an **electronic tensioning** system. The **high-precision manufacture** of individual components is an essential aspect here because manufacturers and users must be able to rely on the installed drives to achieve the level of accuracy required.

We offer the **highest levels of** precision, dynamics and rigidity as well as an extended service life that more than satisfy the demanding requirements of machine and system manufacturers. The result of our efforts is maximum performance across the board. WITTENSTEIN alpha has managed to move the old established system of rack and pinion **back into the fast lane**.

Always there for you.

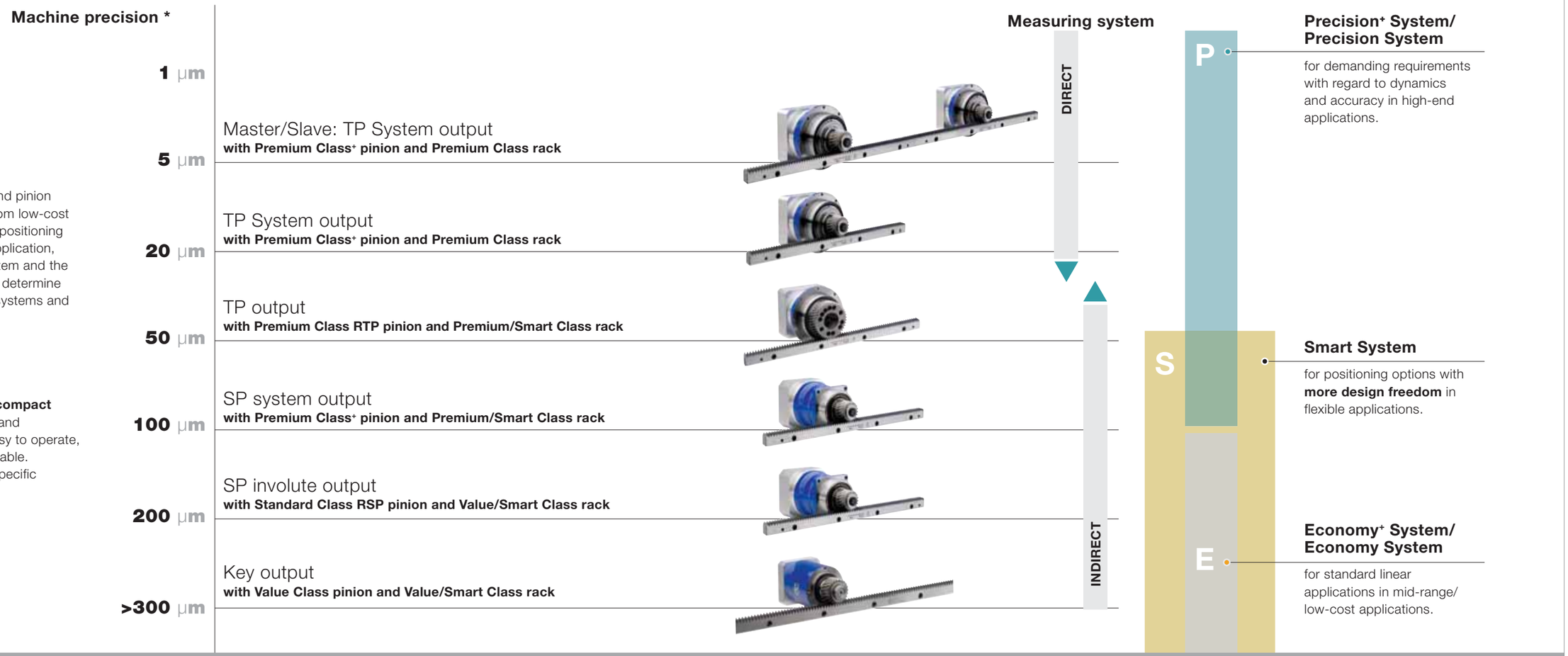
If you are striving to achieve your objectives quickly and implement solutions efficiently and individually, then WITTENSTEIN alpha is the perfect partner for you.

Make a decision in favor of world-class technology that will give your customers a leading edge and help further consolidate your partnership together.

The **systems** and **applications**

The right gearhead, rack and pinion **for every application** – from low-cost to high-end solutions. The positioning accuracy required in the application, the existing measuring system and the machine design essentially determine the configuration of linear systems and system combinations.

A real powerhouse with **a compact design**. Constant **rigidity** and outstanding **dynamics**. Easy to operate, quickly becomes indispensable. **Customized** to suit your specific application areas.



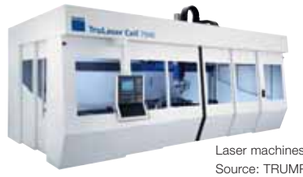
* depending on other components.

Competent consultation

Staff at our **Technical Office** will be glad to answer any questions you may have about alpha Rack & Pinion Systems and your specific configurations. Give us a call!

HSC (High Speed Cutting) portal milling machines
Source: F. Zimmermann GmbH

Profile machining centers
Source: Handtmann A-Punkt Automation GmbH



Laser machines
Source: TRUMPF Werkzeug-maschinen GmbH + Co. KG

Wood, plastic/composite machining centers
Source: MAKA – Max Mayer Maschinenbau GmbH © MAKA

Gas cutting machines
Source: LIND GmbH Industrial Equipment

Robot arms in automation engineering
Source: MOTOMAN Robotics Europe AB

Precision System

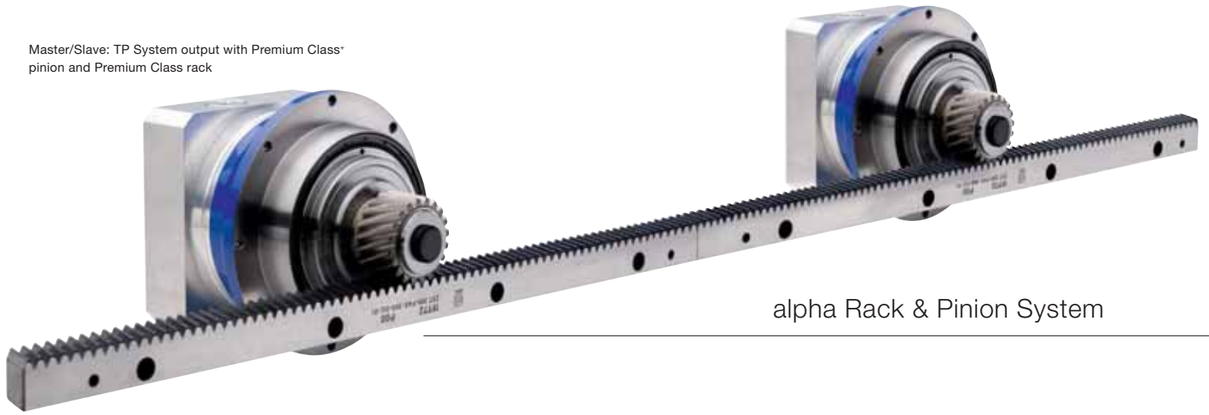
Eroding machines · Grinding machines · HSC portal milling machines · Turning machines · Machining centers · Boring machines · Laser machines · Punching machines

Smart System

Economy System

Water jet cutting machines · CNC wood/plastic processing machines · Gas cutting machines · Pipe bending machines · Foam cutting machines · Automation engineering

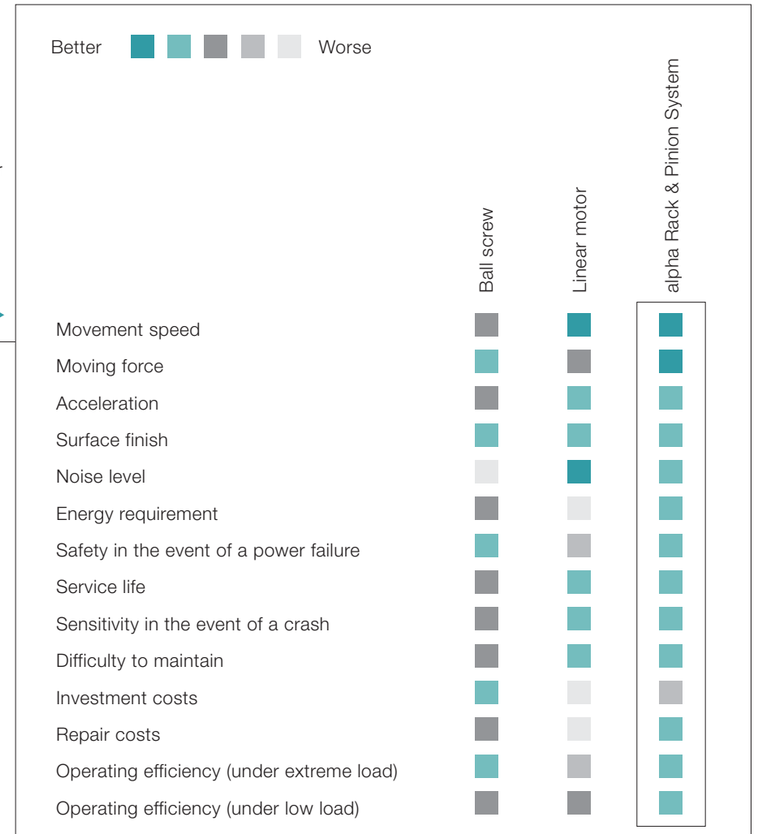
Master/Slave: TP System output with Premium Class+ pinion and Premium Class rack



alpha Rack & Pinion System

The right gearhead, rack and pinion for every application.

A direct comparison



The comparison is based on typical processes involved in machining large workpieces and machines with long movement paths.

alpha Rack & Pinion System – **the benefits for you**

Dynamic

- Maximum movement speed and acceleration with low moments of inertia.
- Extremely good control characteristics due to constant linear rigidity along the entire movement path.

Precise

- New drive solutions with unique true running accuracy.
- Maximum positioning accuracy due to precision alignment of components.

Efficient

- Effortless operation.
- Minimal mounting space and high power density.
- Enormous savings potential due to high level of energy efficiency.

In detail

Feel the dynamics.
Experience the precision.
Maximize efficiency.

Solution-oriented concepts, sophisticated development phases and perfect results. Helping you become a top performer.

alpha Rack & Pinion Systems will optimize your applications. Find out for yourself. Help your company **take giant strides towards achieving its goals.**

Three classes of rack – **unlimited possibilities**

The correct rack is an essential component in realizing your machine concepts. WITTENSTEIN alpha offers three classes of rack Premium Class, Value Class and Smart Class to find the right solution for your application requirements.

Have the freedom to implement your ideas!

Precision System

Premium Class

Solution for **extremely dynamic, precision high-end** applications.

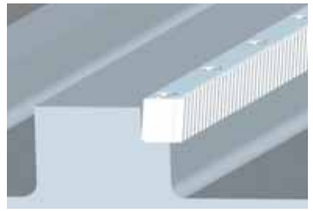
For greater precision: linear and gantry sorting possible.
Contact us!

Economy System

Value Class

Solution for **mid-range and economy** applications.

Standard installation concept:
permanent connection to mounting edge

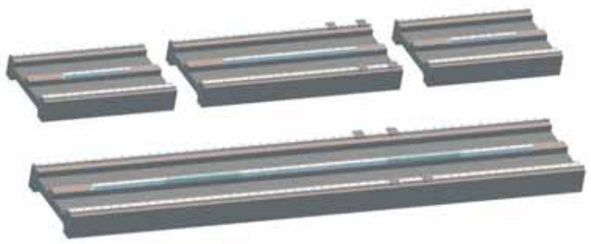


Smart System

New feature: free connection option

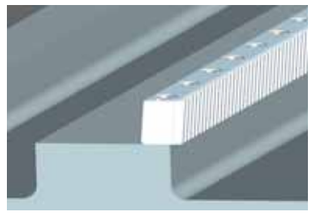
Smart Class

The flexible rack for applications **with no available mounting edge in the economy to mid-range** sector.



The flexible modular assembly concept makes the Smart Class rack a versatile all-rounder.

New: free connection without mounting edge



Extremely flexible concept

Free connection concept:
The absence of the mounting edge allows simple and uncomplicated mounting of the rack parallel to the machine guide.

Modular machine concept:
The 60 mm hole pattern and length of 480 mm **are compatible with the hole patterns on linear guides** produced by well-known manufacturers and enable the implementation of modular machine concepts.

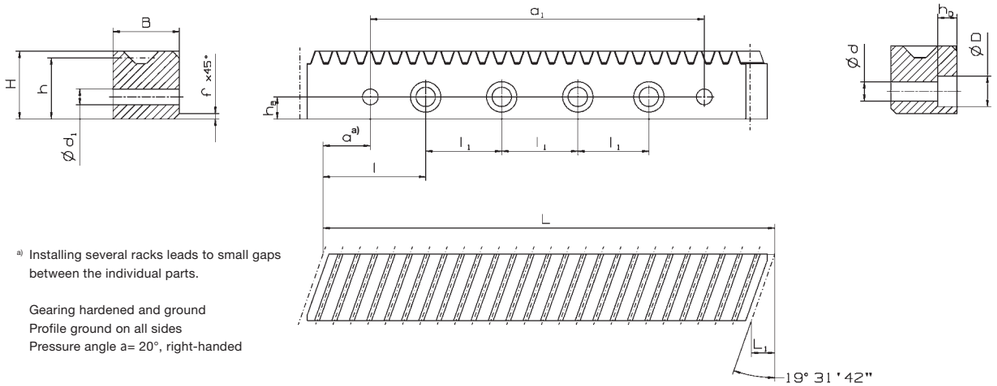
Clearing the way for **unlimited movement paths.**

Premium Class rack

Module	p_t	L	z	a [a)]	a_1	B	d	d_1 [b)]	D	$f^{+0.5}$	h	h_B	h_D	H	l	l_1	L_1
2	6.67	500	75	31.7	436.6	24	7	5.7	11	2	22	8	7	24	62.5	125.0	8.5
2	6.67	333	50	31.7	269.9	24	7	5.7	11	2	22	8	7	24	62.5	104.2	8.5
2	6.67	167	25	31.7	103.3	24	7	5.7	11	2	22	8	7	24	62.5	41.7	8.5
3	10	500	50	35.0	430	29	10	7.7	15	2	26	9	9	29	62.5	125.0	10.3
3	10	250	25	35.0	180	29	10	7.7	15	2	26	9	9	29	62.5	125.0	10.3
4	13.33	507	38	18.3	460	39	12	9.7	18	3	35	12	11	39	62.5	125.0 [c)]	13.8
5	16.67	500	30	37.5	425	49	14	11.7	20	3	34	12	13	39	62.5	125.0	17.4
6	20	500	25	37.5	425	59	18	15.7	26	3	43	16	17	49	62.5	125.0	20.9

All dimensions in [mm]
Cumulative pitch error Fp: 12 µm for m2 and m3 (250 mm in length); Fp: 15 µm for m > 2
Single pitch error fp: 3 µm
[b)] Recommended tolerance dimension: $6^{H7}/8^{H7}/10^{H7}/12^{H7}/16^{H7}$
[c)] Hole spacing between two racks on module 4 is 131.67 mm.

p_t = Reference circle pitch
z = Number of teeth
m = Module



[a)] Installing several racks leads to small gaps between the individual parts.

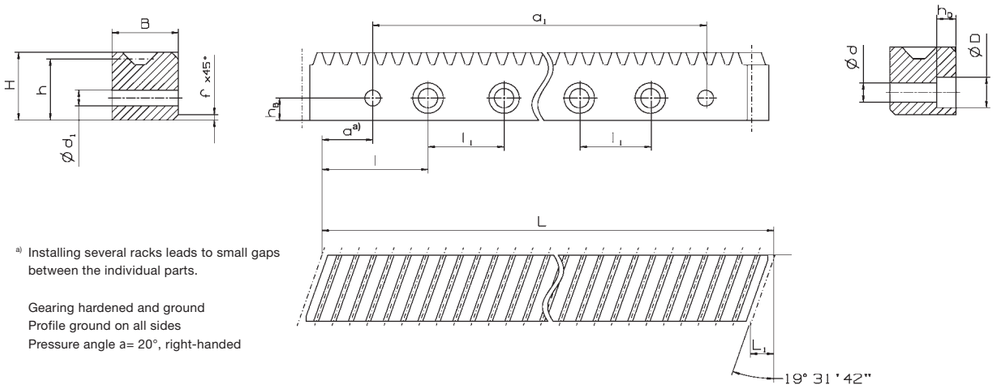
Gearing hardened and ground
Profile ground on all sides
Pressure angle a= 20°, right-handed

Value Class rack

Module	p_t	L	z	a [a)]	a_1	B	d	d_1 [b)]	D	$f^{+0.5}$	h	h_B	h_D	H	l	l_1	L_1
2	6.67	1000	150	31.7	936.6	24	7	5.7	11	2	22	8	7	24	62.5	125	8.5
3	10	1000	100	35	930	29	10	7.7	15	2	26	9	9	29	62.5	125	10.3
4	13.33	1000	75	33.3	933.4	39	10	7.7	15	3	35	12	9	39	62.5	125	13.8
5	16.67	1000	60	37.5	925	49	14	11.7	20	3	34	12	13	39	62.5	125	17.4
6	20	1000	50	37.5	925	59	18	15.7	26	3	43	16	17	49	62.5	125	20.9

All dimensions in [mm]
Cumulative pitch error Fp: 35 µm/1000 mm
Single pitch error fp: 8 µm; 10 µm at m5 and m6
[b)] Recommended tolerance dimension: $6^{H7}/8^{H7}/10^{H7}/12^{H7}/16^{H7}$

p_t = Reference circle pitch
z = Number of teeth
m = Module



[a)] Installing several racks leads to small gaps between the individual parts.

Gearing hardened and ground
Profile ground on all sides
Pressure angle a= 20°, right-handed

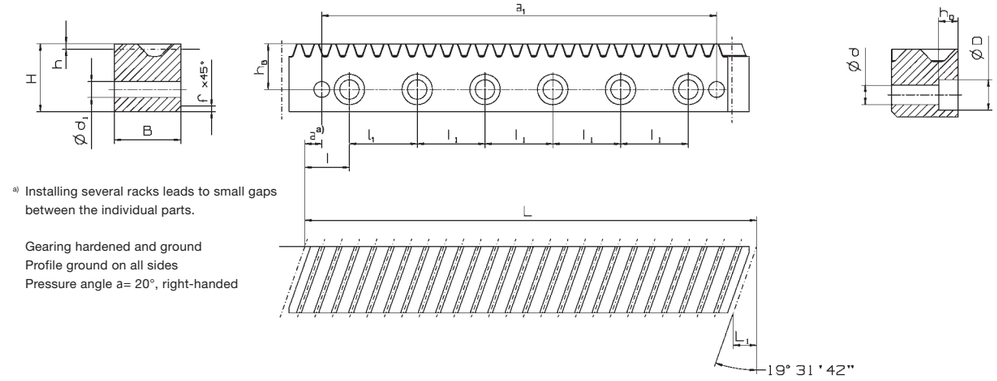
New feature: free connection option

Smart Class rack

Module	p_t	L	z	a [a)]	a_1	B	d	d_1 [b)]	D	$f^{+0.5}$	h	h_B	h_D	H	l	l_1	L_1
2	6.67	480	72	12	453	24	9	7.7	15	2	2	15.5	8.5	24.2	30	60	8.5
3	10	480	48	10.2	453	29	11	7.7	17	2	3	19.5	10.5	29.2	28.2	60	10.3
4	13.33	480	36	7	452	39	14	9.7	20	3	4	28	13	39.2	23	60	13.8

All dimensions in [mm]
Cumulative pitch error Fp: 30 µm/500 mm
Single pitch error fp: 6 µm
[b)] Recommended tolerance dimension: 8^{H7}, 10^{H7}

p_t = Reference pitch circle
z = Number of teeth
m = Module



[a)] Installing several racks leads to small gaps between the individual parts.

Gearing hardened and ground
Profile ground on all sides
Pressure angle a= 20°, right-handed

Premium Class+ pinion on TP system output with Premium Class rack

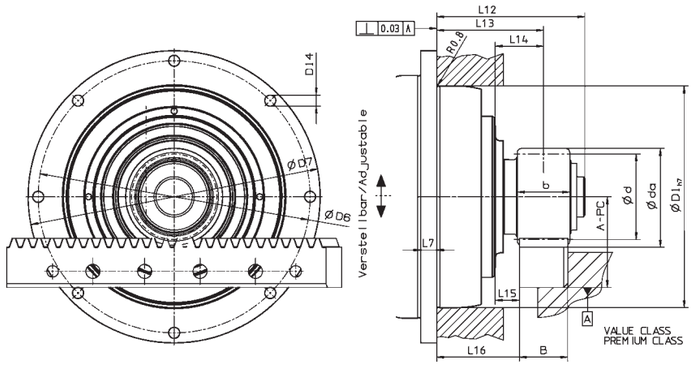
(all pinions, pressure angle α=20°, inclination angle β=19,5283° left-handed)

TP System output	Module	z	A-PC ±0.3 a)	b	B	d_a	d	x	$D1_{h7}$	D6	D7	D14	L7	L12	L13	L14	L15	L16
TP+ 010 (MA, MF)	2	20	44.0	26	24	48.3	42.441	0.4	90	109	118	5.5	7	71.0	50.5	20.5	8.5	38.5
TP+ 025 (MA, MF)	2	20	44.0	26	24	48.3	42.441	0.4	110	135	145	5.5	8	73.5	53.0	24.0	12.0	41.0
	2	40	64.4	26	24	89.2	84.883	0						73.5	53.0	24.0	12.0	41.0
	3	20	59.0	31	29	72.3	63.662	0.4						76.0	52.5	23.5	9.0	38.0
TP+ 050 (MA, MF)	2	40	64.4	26	24	89.2	84.883	0	140	168	179	6.6	10	87.0	66.5	28.5	16.5	54.5
	3	20	59.0	31	29	72.3	63.662	0.4						89.5	66.0	28.0	13.5	51.5
	3	34	80.1	31	29	114.5	108.226	0						90.5	66.0	28.0	13.5	51.5
	4	20	78.2	41	39	94.8	84.882	0.2						97.0	67.5	29.5	10.0	48.0
TP+ 110 (MA, MF)	3	34	80.1	31	29	114.5	108.226	0	200	233	247	9	12	106.0	81.5	31.5	17.0	67.0
	4	20	78.2	41	39	94.8	84.882	0.2						112.5	83.0	33.0	13.5	63.5
	4	30	98.7	41	39	135.6	127.324	0						112.5	83.0	33.0	13.5	63.5
	5	19	86.4	51	49	115.1	100.798	0.4						120.0	85.0	35.0	10.5	60.5
TP+ 300 (MA, MF)	4	30	98.7	41	39	135.6	127.324	0	255	280	300	13.5	18	131.5	102.0	36.0	16.5	82.5
	5	19	86.4	51	49	115.1	100.798	0.4						139.0	104.0	38.0	13.5	79.5
	5	30	113.6	51	49	169.4	159.155	0						135.0	104.0	38.0	13.5	79.5
	6	19	105.9	61	59	138.0	120.958	0.4						142.5	106.0	40.0	10.5	76.5
TP+ 500 (MA, MF)	5	30	113.6	51	49	169.4	159.155	0	285	310	330	13.5	20	147.5	116.5	41.5	17.0	92.0
	6	19	105.9	61	59	138.0	120.958	0.4						155.0	118.5	43.5	14.0	89.0
	6	28	132.1	61	59	190.5	178.254	0						154.0	118.5	43.5	14.0	89.0

All dimensions in [mm]
a) please contact us for precise dimensions; align mechanism recommended (alignment dimension ± 0.3 mm)

z = Number of teeth
d_a = Tip diameter
d = Partial circle diameter
x = Profile correction

MA = HIGH TORQUE
MF = Standard



True running accuracy < 10 µm (m2)

TP+ gearhead with Premium Class+ pinion on TP system output with Premium Class rack

· Technical data for the smallest available ratio

	Module	z	F_{2T} [N] (lb_f) MF i = 4	F_{2T} [N] (lb_f) MA i = 22	T_{2B} [Nm] (in.lb) MF i = 4	T_{2B} [Nm] (in.lb) MA i = 22	V_{Max} [m/min] (in/sec.) MF i = 4	V_{Max} [m/min] (in/sec) MA i = 22	m_{pinion} [kg] (lb_m)
TP+ 010 (MA, MF)	2	20	2400 (540)	2400 (540)	51 (452)	51 (452)	200 (132)	36 (24)	0.4 (0.9)
TP+ 025	2	20	3400 (765)	3400 (765)	72 (638)	72 (638)	150 (99)	36 (24)	0.4 (0.9)
	2	40	3400 (765)	3400 (765)	144 (1275)	144 (1275)	300 (197)	72 (48)	1.3 (2.9)
	3	20	3400 (765)	3400 (765)	108 (956)	108 (956)	225 (148)	54 (36)	1.0 (2.3)
TP+ 050	2	40	7100 (1598)	7100 (1598)	301 (2664)	301 (2664)	267 (176)	60 (40)	1.3 (2.9)
	3	20	11100 (2498)	11100 (2498)	353 (3125)	353 (3125)	200 (132)	45 (30)	1.0 (2.3)
	3	34	10800 (2430)	10800 (2430)	584 (5169)	584 (5169)	340 (224)	77 (51)	2.4 (5.4)
	4	20	10800 (2430)	10800 (2430)	458 (4054)	458 (4054)	267 (176)	60 (40)	2.0 (4.5)
TP+ 110	3	34	13000 (2925)	13000 (2925)	703 (6222)	703 (6222)	298 (196)	69 (46)	2.4 (5.3)
	4	20	21000 (4725)	21000 (4725)	891 (7886)	891 (7886)	233 (153)	54 (36)	2.0 (4.5)
	4	30	22000 (4950)	22000 (4950)	1401 (12399)	1401 (12399)	350 (230)	81 (54)	3.9 (8.7)
	5	19	21000 (4725)	21000 (4725)	1058 (9364)	1058 (9364)	277 (182)	64 (42)	3.1 (6.9)
	Module	**z**	**i = 5**	**i = 22**	**i = 5**	**i = 22**	**i = 5**	**i = 22**	
TP+ 300	4	30	22000 (4950)	22000 (4950)	1401 (12399)	1401 (12399)	200 (132)	54 (36)	3.9 (8.7)
	5	19	31000 (6975)	31000 (6975)	1562 (13824)	1562 (13824)	158 (104)	43 (29)	3.1 (6.9)
	5	30	30300 (6818)	30300 (6818)	2411 (21338)	2411 (21338)	250 (164)	68 (45)	10.4 (23)
	6	19	30500 (6863)	30500 (6863)	1845 (16329)	1845 (16329)	190 (125)	51 (34)	5.8 (12.9)
TP+ 500	5	30	34000 (7650)	34000 (7650)	2706 (23949)	2706 (23949)	220 (145)	68 (45)	10.4 (23)
	6	19	41000 (9225)	41000 (9225)	2480 (21948)	2480 (21948)	165 (109)	51 (34)	5.8 (12.9)
	6	28	41000 (9225)	41000 (9225)	3654 (32338)	3654 (32338)	245 (161)	76 (50)	14.5 (32.1)

Technical data based on 1000 load cycles per hour.
More combinations possible with cymex®

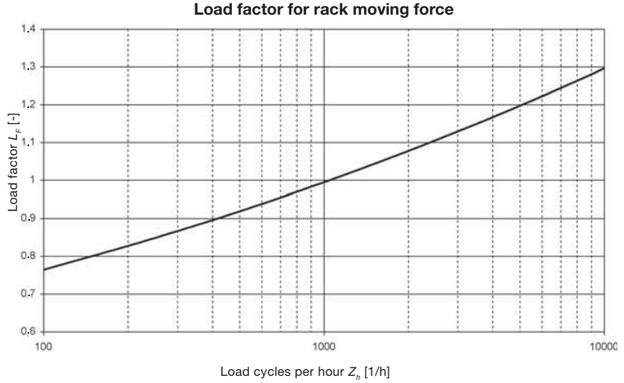
F_{2T} = Max. moving force
T_{2B} = Max. acceleration torque

MA = HIGH TORQUE
MF = Standard

In Z -axis without a balancing weight additional load changes can be caused due to additional movements in other axes.

Calculation including load factor:
$F_{2t} * L_F = F_{2t,\,LF} < F_{2T}$

Load factor for rack moving force



Premium Class RTP pinion on TP output with Premium and Smart Class rack

(all pinions, pressure angle α=20°, inclination angle β=19,5283° left-handed)

TP output	Module	z	A-PC ±0,3 [b]	A-SC ±0,3 [b]	b	B	d_a	d	x	$D5_{h7}$	D6	D7	D14	L4	L5	L7	L12	L16
TP⁺/TK⁺ 004	2	26	50.4	41.9	26	24	60.7	55.173	0.4	64	79	86	4.5	19.5	8	4	7.2	20.5
TP⁺/TK⁺/ TPK⁺ 010	2	29 [a]	53.4	44.9	26	24	66.6	61.539	0.3	90	109	118	5.5	40	11	7	8.3	41
	2	33	57.6	49.1	26	24	75.1	70.028	0.3	90	109	118	5.5	30	11	7	8.3	31
	2	37	61.9	53.4	26	24	83.6	78.516	0.3	90	109	118	5.5	30	11	7	8.3	31
TP⁺/TK⁺/ TPK⁺ 025	2	35 [a]	59.7	51.2	26	24	79.4	74.272	0.3	110	135	145	5.5	39	10	8	8.6	40
	2	40 [c]	65.0	56.5	26	24	90.0	84.882	0.3	110	135	145	5.5	29	10	8	8.6	30
	2	45	70.2	61.7	26	24	100.2	95.493	0.22	110	135	145	5.5	29	10	8	8.6	30
TP⁺/TK⁺/ TPK⁺ 050	3	31 [a]	76.2	66.7	31	29	106.4	98.676	0.3	140	168	179	6.6	51	14.5	10	11.3	52
	3	35 [c]	82.6	73.1	31	29	119.1	111.409	0.3	140	168	179	6.6	38	14.5	10	11.3	39
	3	40 [c]	90.6	81.1	31	29	135.0	127.324	0.3	140	168	179	6.6	38	14.5	10	11.3	39
TP⁺/TK⁺/ TPK⁺ 110	4	38	116.6	105.6	41	39	171.3	161.277	0.25	200	233	247	9	50	17.5	12	14.5	51
	4	40 [d]	119.9	108.9	41	39	177.9	169.766	0	200	233	247	9	50	17.5	12	14.5	51
TP⁺ 300	5	32 [a] [c]	120.3	–	51	49	182.6	169.766	0.285	255	280	300	13.5	91	20	18	20	92
TP⁺ 500	6	31 [a]	143.4	–	61	59	212.8	197.352	0.295	285	310	330	13.5	110	20	20	20	111

All dimensions in [mm]
[a] with adapter flange
[b] please contact us for precise dimensions; align mechanism recommended (alignment dimension ±0.3 mm)
[c] also in combination with TP⁺ HIGH TORQUE
[d] only in combination with TP⁺ HIGH TORQUE

z = Number of teeth
d_a = Tip diameter
d = Partial circle diameter
x = Profile correction

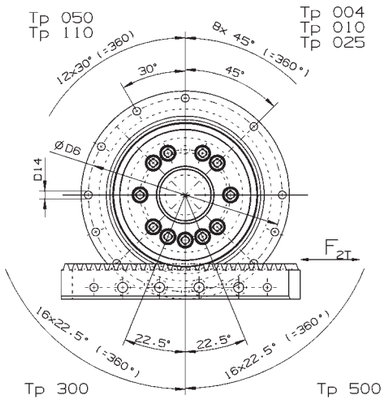
TP⁺ gearhead with Premium Class RTP pinion on TP output with Premium and Smart Class rack · Technical data for the smallest available ratio

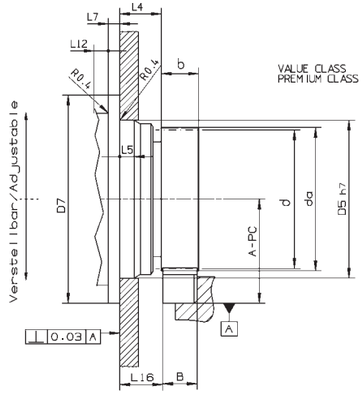
	Module	z	F_{2T} [N] (lb_f) MF i = 4 (PC)	F_{2T} [N] (lb_f) MF i = 4 (SC)	F_{2T} [N] (lb_f) MA i = 22 (PC)	F_{2T} [N] (lb_f) MA i = 22 (SC)	T_{2B} [Nm] (in.lb) MF i = 4 (PC)	T_{2B} [Nm] (in.lb) MF i = 4 (SC)	T_{2B} [Nm] (in.lb) MA i = 22 (PC)	T_{2B} [Nm] (in.lb) MA i = 22 (SC)	V_{Max} [m/min] (in/sec) MF i = 4	V_{Max} [m/min] (in/sec) MA i = 22	m_{pinion} [kg] (lb_m)
TP⁺ 004	2	26	1400 (315)	1400 (315)	–	–	39 (346)	39 (346)	–	–	255 (168)	–	0.41 (0.91)
TP⁺ 010	2	29	2300 (518)	2300 (518)	–	–	71 (629)	71 (629)	–	–	290 (191)	–	0.45 (1)
	2	33	2550 (574)	2550 (574)	–	–	89 (788)	89 (788)	–	–	330 (217)	–	0.60 (1.33)
	2	37	2500 (563)	2500 (563)	–	–	98 (868)	98 (868)	–	–	370 (243)	–	0.80 (1.77)
TP⁺ 025	2	35	3400 (765)	3400 (765)	–	–	126 (1116)	126 (1116)	–	–	260 (171)	–	0.62 (1.38)
	2	40 [a]	3700 (833)	3700 (833)	3700 (833)	3700 (833)	157 (1390)	157 (1390)	157 (1390)	157 (1390)	300 (197)	72 (48)	0.85 (1.88)
	2	45	3600 (810)	3600 (810)	–	–	172 (1523)	172 (1523)	–	–	335 (220)	–	1.15 (2.55)
TP⁺ 050	3	31	10800 (24230)	9000 (2025)	–	–	533 (4718)	444 (3930)	–	–	310 (204)	–	1.40 (3.1)
	3	35 [a]	12000 (2700)	9000 (2025)	12000 (2700)	9000 (2025)	668 (5912)	501 (4434)	668 (5912)	501 (4434)	340 (224)	78 (52)	1.77 (3.92)
	3	40 [a]	12000 (2700)	9000 (2025)	12000 (2700)	9000 (2025)	764 (6762)	573 (5072)	764 (6762)	573 (5072)	390 (256)	90 (60)	2.50 (5.53)
TP⁺ 110	4	38	22000 (4950)	16000 (3600)	–	–	1774 (15700)	1290 (11417)	–	–	440 (289)	–	5.55 (12.27)
	4	40 [b]	–	–	22000 (4950)	16000 (3600)	–	–	1867 (16523)	1358 (12019)	–	108 (71)	5.24 (11.59)
	Module	**z**	**i = 5**		**i = 22**		**i = 5**		**i = 22**		**i = 5**	**i = 22**	
TP⁺ 300	5	32 [a]	28300 (6368)	–	28300 (6368)	–	2402 (21258)	–	2402 (21258)	–	265 (174)	72 (48)	6.47 (14.30)
TP⁺ 500	6	31	36400 (8190)	–	–	–	3592 (31790)	–	–	–	270 (178)	–	12.3 (27.19)

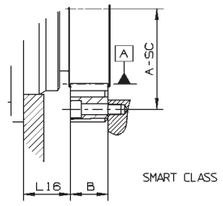
Technical data based on 1000 load cycles per hour.
More combinations possible with cymex®
[a] also in combination with TP⁺ HIGH TORQUE
[d] only in combination with TP⁺ HIGH TORQUE

= Max. moving force
= Max. acceleration torque
SC = Smart Class
PC = Premium Class

MA = HIGH TORQUE
MF = Standard





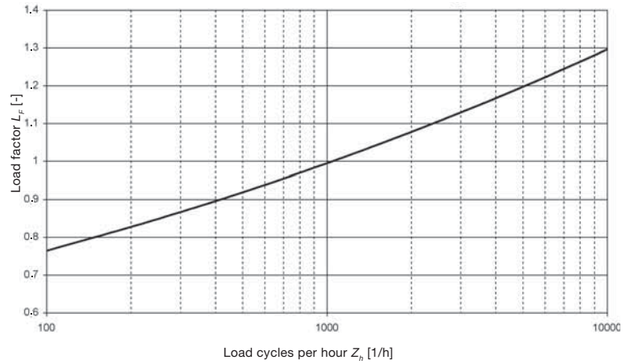


True running accuracy < 10 µm (m2)

In Z -axis without a balancing weight additional load changes can be caused due to additional movements in other axes.

Calculation including load factor:
$F_{2t} * L_F = F_{2t,\,LF} < F_{2T}$

Load factor for rack moving force



Premium Class⁺ pinion on **SP⁺ System output** with **Premium** and **Smart Class rack**

(all pinions, pressure angle α=20°, inclination angle β=19,5283° left-handed)

SP system output	Module	z	A-PC ±0,3 a)	A-SC ±0,3 a)	b	B	d_a	d	x	$D1_{g6}$	D4	D5	L3	L4	L11 ±1	L12	L13	L14	L15	L16
SP⁺ 075	**2**	20	44.0	35.5	26	24	48.3	42.441	0.4	70	6.6	85	20	7	76	61.0	40.5	20.5	8.5	28.5
SP⁺ 100	**2**	20	44.0	35.5	26	24	48.3	42.441	0.4	90	9	120	30	10	101	71.5	51.0	21.0	9	39
	2	40	64.4	55.9	26	24	89.2	84.883	0							71.0	51.0	21.0	9	39
	3	20	59.0	49.5	31	29	72.3	63.662	0.4							73.5	54.0	24.0	9.5	39.5
SP⁺ 140	**2**	40	64.4	55.9	26	24	89.2	84.883	0	130	11	165	30	12	141	75.0	54.5	24.5	12.5	42.5
	3	20	59.0	49.5	31	29	72.3	63.662	0.4							77.5	54.0	24.0	9.5	39.5
	3	34	80.1	70.6	31	29	114.5	108.226	0							77.0	54.0	24.0	9.5	39.5
	4	20	78.2	67.2	41	39	94.8	84.882	0.2							83.5	59.0	29.0	9.5	39.5
SP⁺ 180	**3**	34	80.1	70.6	31	29	114.5	108.226	0	160	13.5	215	30	15	182	82.0	57.5	27.5	13	43
	4	20	78.2	67.2	41	39	94.8	84.882	0.2							88.5	59.0	29.0	9.5	39.5
	4	30	98.7	87.7	41	39	135.6	127.324	0							87.0	59.0	29.0	9.5	39.5
	5	19	86.4	–	51	49	115.1	100.798	0.4							94.5	64.5	34.5	10	40
SP⁺ 210	**4**	30	98.7	87.7	41	39	135.6	127.324	0	180	17	250	38	17	215	99.9	70.4	32.5	13	50.9
	5	19	86.4	–	51	49	115.1	100.798	0.4							107.4	72.4	34.5	10	47.9
	5	30	113.6	–	51	49	169.4	159.155	0							105.9	72.4	34.5	10	47.9
	6	19	105.9	–	61	59	138.0	120.958	0.4							113.4	77.9	40.0	10.5	48.4
SP⁺ 240	**5**	30	113.6	–	51	49	169.4	159.155	0	200	17	290	40	20	242	109.9	78.9	39.0	14.5	54.4
	6	19	105.9	–	61	59	138.0	120.958	0.4							120.9	80.9	41.0	11.5	51.4
	6	28	132.1	_	61	59	190.5	178.254	0							119.9	80.9	41.0	11.5	51.4

All dimensions in [mm]

a) please contact us for precise dimensions;
align mechanism recommended (alignment dimension ±0.3 mm)

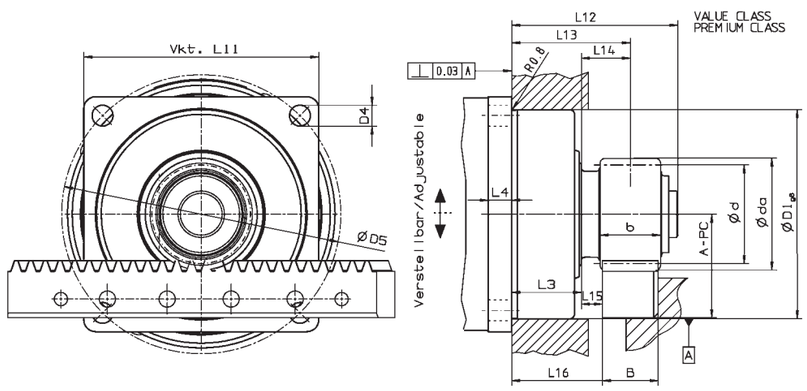
z = Number of teeth
d_a = Tip diameter
d = Partial circle diameter
x = Profile correction

SP⁺ gearhead with **Premium⁺ pinion on SP⁺ system output** with **Premium and Smart Class rack** · Technical data for the smallest available ratio

	Module	z	F_{2T} [N] (lb_f) i = 4 (PC)	F_{2T} [N] (lb_f) i = 4 (SC)	F_{2T} [N] (lb_f) i = 16 (PC)	F_{2T} [N] (lb_f) i = 16 (SC)	T_{2B} [Nm] (in.lb) i = 4 (PC)	T_{2B} [Nm] (in.lb) i = 4 (SC)	T_{2B} [Nm] (in.lb) i = 16 (PC)	T_{2B} [Nm] (in.lb) i = 16 (SC)	V_{Max} [m/min] (in/sec) i = 4	V_{Max} [m/min] (in/sec) i = 16	m_{pinion} [kg] (lb_m)
SP⁺ 075	**2**	20	3300 (743)	3300 (743)	3300 (743)	3300 (743)	68 (602)	68 (602)	68 (602)	68 (602)	200 (132)	50 (33)	0.4 (0.89)
SP⁺ 100	**2**	20	6400 (1440)	5000 (1125)	6400 (1440)	5000 (1125)	136 (1204)	106 (939)	136 (1204)	106 (939)	150 (99)	37 (25)	0.4 (0.89)
	2	40	6100 (1373)	5000 (1125)	6100 (1373)	5000 (1125)	259 (2293)	212 (1877)	259 (2293)	212 (1877)	300 (197)	75 (50)	1.3 (2.88)
	3	20	6000 (1350)	6000 (1350)	6000 (1350)	6000 (1350)	191 (1691)	191 (1691)	191 (1691)	191 (1691)	225 (148)	56 (37)	1.0 (2.21)
SP⁺ 140	**2**	40	7100 (1598)	5000 (1125)	7100 (1598)	5000 (1125)	301 (2664)	212 (1877)	301 (2664)	212 (1877)	266 (175)	66 (44)	1.3 (2.88)
	3	20	10000 (2250)	9000 (2025)	10000 (2250)	9000 (2025)	318 (2815)	286 (2532)	318 (2815)	286 (2532)	200 (132)	50 (33)	1.0 (2.21)
	3	34	9800 (2205)	9000 (2025)	9800 (2205)	9000 (2025)	530 (4691)	487 (4310)	530 (4691)	487 (4310)	340 (224)	85 (56)	2.4 (5.31)
	4	20	9400 (2115)	9400 (2115)	9400 (2115)	9400 (2115)	399 (3532)	399 (3532)	399 (3532)	399 (3532)	266 (175)	66 (44)	2.0 (4.42)
SP⁺ 180	**3**	34	13600 (3060)	9000 (2025)	13600 (3060)	9000 (2025)	736 (6514)	487 (4310)	736 (6514)	487 (4310)	297 (195)	85 (56)	2.4 (5.31)
	4	20	13600 (3060)	13600 (3060)	13600 (3060)	13600 (3060)	577 (5107)	577 (5107)	577 (5107)	577 (5107)	233 (153)	66 (44)	2.0 (4.42)
	4	30	13200 (2970)	13200 (2970)	13200 (2970)	13200 (2970)	840 (7434)	840 (7434)	840 (7434)	840 (7434)	350 (230)	100 (66)	3.9 (8.62)
	5	19	12800 (2880)	–	12800 (2880)	–	645 (5709)	–	645 (5709)	–	277 (182)	78 (52)	3.1 (6.86)
SP⁺ 210	**4**	30	21700 (4883)	16000 (3600)	21700 (4883)	16000 (3600)	1381 (1222)	1019 (9019)	1381 (12222)	1019 (9019)	250 (164)	87 (58)	2.0 (4.42)
	5	19	21800 (4905)	–	21800 (4905)	–	1099 (9727)	–	1099 (9727)	–	197 (130)	69 (46)	3.9 (8.62)
	5	30	21000 (4725)	–	21000 (4725)	–	1671 (14789)	–	1671 (14789)	–	312 (205)	109 (72)	3.1 (6.86)
	6	19	20600 (4635)	–	20600 (4635)	–	1246 (11028)	–	1246 (11028)	–	237 (156)	83 (55)	10.4 (22.99)
SP⁺ 240	**5**	30	31700 (7133)	–	31700 (7133)	–	2523 (22329)	–	2523 (22329)	–	275 (181)	109 (72)	10.4 (22.99)
	6	19	32000 (7200)	–	32000 (7200)	–	1935 (17125)	–	1935 (17125)	–	209 (138)	83 (55)	5.8 (12.82)
	6	28	31000 (697)	–	31000 (6975)	–	2763 (24453)	–	2763 (24453)	–	308 (203)	122 (81)	14.5 (32.05)

Technical data based on 1000 load cycles per hour.
More combinations possible with cymex®

F_{2T} = Max. moving force
T_{2B} = Max. acceleration torque

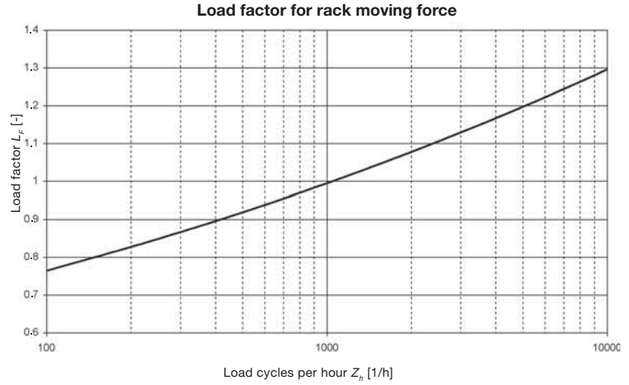


True running accuracy < 10 µm (m2)

In Z -axis without a balancing weight additional load changes can be caused due to additional movements in other axes.

Calculation including load factor:
$F_{2t} * L_F = F_{2t,\,LF} < F_{2T}$

Load factor for rack moving force



Standard Class RSP pinion with SP involute output with Value and Smart Class rack

(all pinions, pressure angle α=20°, inclination angle β=19,5283° left-handed)

Output with SP involute toothing DIN5480	Module	z	A-VC ±0.3 a)	A-SC ±0.3 a)	b	B	d_a	d	x	$D1_{g6}$	D4	D5	L3	L4	L11 ± 1	L12	L16	L23
SP⁺/ SK⁺ 060	2	15	38.9	30.4	26	24	37.8	31.831	0.5	60	5.5	68	20	6	62	2	27	32
	2	16	40.0	31.5	26	24	40.0	33.953	0.5	60	5.5	68	20	6	62	2	27	32
	2	18	41.9	33.4	26	24	43.8	38.197	0.4	60	5.5	68	20	6	62	2	27	32
SP⁺/SK⁺/ SPK⁺ 075 VDS 050	2	18	41.9	33.4	26	24	43.8	38.197	0.4	70	6.6	85	20	7	76	2.5	28	33
	2	20	44.0	35.5	26	24	48.1	42.441	0.4	70	6.6	85	20	7	76	2.5	28	33
	2	22	46.1	37.6	26	24	52.3	46.686	0.4	70	6.6	85	20	7	76	2.5	28	33
SP⁺/SK⁺/ SPK⁺ 100 VDS 063	2	23	47.2	38.7	26	24	54.4	48.808	0.4	90	9	120	30	10	101	3	39	34
	2	25	49.3	40.8	26	24	58.6	53.052	0.4	90	9	120	30	10	101	3	39	34
	2	27	51.2	42.7	26	24	62.5	57.296	0.3	90	9	120	30	10	101	3	39	34
SP⁺/SK⁺/ SPK⁺ 140 VDS 080	3	20	59.0	49.5	31	29	71.7	63.662	0.4	130	11	165	30	12	141	3	51	51
	3	22	62.2	52.7	31	29	78.3	70.028	0.4	130	11	165	30	12	141	3	51	51
	3	24	65.4	55.9	31	29	84.7	76.394	0.4	130	11	165	30	12	141	3	51	51
SP⁺/SK⁺/ SPK⁺ 180 VDS 100	4	20	79.0	68.0	41	39	96.1	84.883	0.4	160	13.5	215	30	15	182	3	44	54
SP⁺ 210	4	25	89.4	78.4	41	39	116.8	106.103	0.34	180	17	250	38	17	215	3	63	65
SP⁺ 240	5	24	99.4	–	51	49	140.8	127.324	0.35	200	17	290	40	20	242	3	63	73

All dimensions in [mm]
a) please contact us for precise dimensions;
align mechanism recommended (alignment dimension ±0.3 mm)

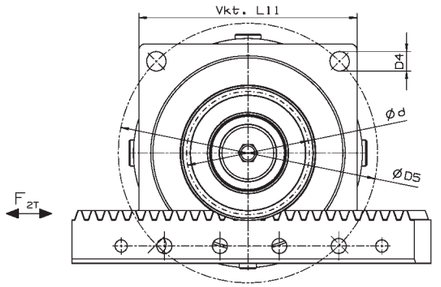
z = Number of teeth
d_a = Tip diameter
d = Partial circle diameter
x = Profile correction

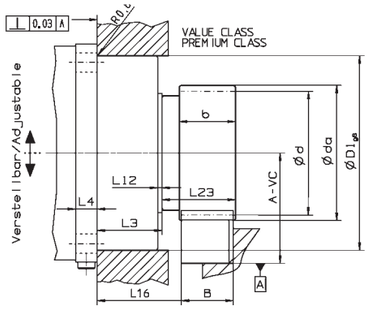
SP⁺ gearhead with Standard Class RSP pinion on SP involute output with Value and Smart Class rack · Technical data for the smallest available ratio

	Module	z	F_{2T} [N] (lb_f) i = 3 (VC)	F_{2T} [N] (lb_f) i = 3 (SC)	F_{2T} [N] (lb_f) i = 16 (VC)	F_{2T} [N] (lb_f) i = 16 (SC)	T_{2B} [Nm] (in.lb) i = 3 (VC)	T_{2B} [Nm] (in.lb) i = 3 (SC)	T_{2B} [Nm (in.lb)] i = 16 (VC)	T_{2B} [Nm] (in.lb) i = 16 (SC)	V_{Max} [m/min] (in/sec) i = 3	V_{Max} [m/min] (in/sec) i = 16	m_{pinion} [kg] (lb_m)
SP⁺ 060	2	15	1800 (405)	1800 (405)	2300 (518)	2300 (518)	29 (257)	29 (257)	37 (328)	37 (328)	200 (132)	37 (25)	0.18 (0.4)
	2	16	1700 (383)	1700 (383)	2300 (518)	2300 (518)	29 (257)	29 (257)	39 (346)	39 (346)	210 (138)	40 (27)	0.19 (0.42)
	2	18	1500 (338)	1500 (338)	2300 (518)	2300 (518)	29 (257)	29 (257)	44 (390)	44 (390)	240 (158)	45 (30)	0.23 (0.51)
SP⁺ 075	2	18	3300 (743)	3300 (743)	3300 (743)	3300 (743)	63 (558)	63 (558)	63 (558)	63 (558)	240 (158)	45 (30)	0.20 (0.45)
	2	20	3300 (743)	3300 (743)	3300 (743)	3300 (743)	70 (620)	70 (620)	70 (620)	70 (620)	260 (171)	50 (33)	0.26 (0.58)
	2	22	3300 (743)	3300 (743)	3300 (743)	3300 (743)	77 (682)	77 (682)	77 (682)	77 (682)	290 (191)	55 (37)	0.32 (0.71)
SP⁺ 100	2	23	4300 (968)	5000 (1125)	4300 (968)	5000 (1125)	105 (930)	122 (1080)	105 (930)	122 (1080)	230 (151)	43 (29)	0.29 (0.65)
	2	25	4300 (968)	5000 (1125)	4300 (968)	5000 (1125)	114 (1009)	133 (1178)	114 (1009)	133 (1178)	250 (164)	47 (31)	0.31 (0.69)
	2	27	4300 (968)	5000 (1125)	4300 (968)	5000 (1125)	123 (1089)	143 (1266)	123 (1089)	143 (1266)	270 (178)	51 (34)	0.46 (1.02)
SP⁺ 140	3	20	8000 (1800)	9000 (2025)	8000 (1800)	9000 (2025)	255 (2257)	286 (2532)	255 (2257)	286 (2532)	260 (171)	50 (33)	0.72 (1.60)
	3	22	8000 (1800)	9000 (2025)	8000 (1800)	9000 (2025)	280 (2478)	315 (2788)	280 (2478)	315 (2788)	290 (191)	55 (37)	0.98 (2.17)
	3	24	8000 (1800)	9000 (2025)	8000 (1800)	9000 (2025)	306 (2709)	344 (3045)	306 (2709)	344 (3045)	320 (210)	60 (40)	1.26 (2.79)
SP⁺ 180	4	20	13000 (2925)	13000 (2925)	13000 (2925)	13000 (2925)	552 (4886)	552 (4886)	552 (4886)	552 (4886)	310 (204)	66 (44)	1.38 (3.05)
SP⁺ 210	4	25	14000 (3150)	16000 (3600)	14000 (3150)	16000 (3600)	743 (6576)	849 (7514)	743 (6576)	849 (7514)	270 (178)	72 (48)	2.24 (4.96)
SP⁺ 240	5	24	22000 (4950)	–	22000 (4950)	–	1401 (12399)	–	1401 (12399)	–	290 (191)	87 (58)	3.96 (8.76)

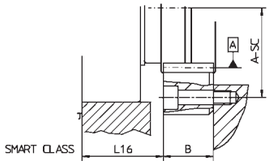
Technical data based on 1000 load cycles per hour.
More combinations possible with cymex®

F_{2T} = Max. moving force
T_{2B} = Max. acceleration torque
SC = Smart Class
VC = Value Class





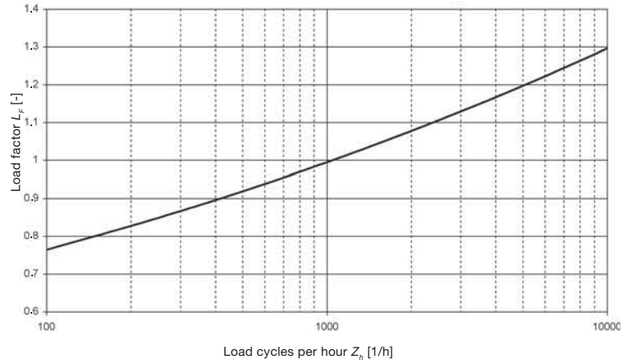
True running accuracy < 40 µm



In Z -axis without a balancing weight additional load changes can be caused due to additional movements in other axes.

Calculation including load factor:
$F_{2t} * L_F = F_{2t,\,LF} < F_{2T}$

Load factor for rack moving force



Value Class pinion (shrunk/bonded) on **shaft key** with **Value** and **Smart Class rack**

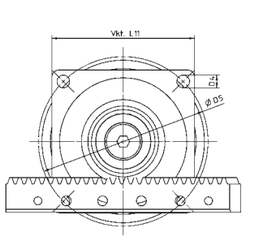
(all pinions, pressure angle α=20°, inclination angle β=19,5283° left-handed)

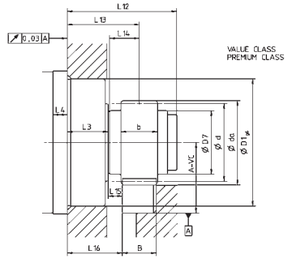
Key output	Module	z	A-VC ±0.3 a)	A-SC ±0.3 a)	b	B	d_a	d	x	$D1_{g6}$	D4	D5	D7	L3	L4	L11	L12	L13	L14	L15	L16
SP⁺/SK⁺ 060	**2**	18	41.9	33.4	26	24	43.7	38.197	0.4	60	5.5	68	0	20	6	62	54	39	19	7	27
SP⁺/SK⁺/ SPK⁺ 075 VDS 050	**2**	22	45.7	37.2	26	24	51.4	46.686	0.2	70	6.6	85	40	20	7	76	62	40	20	8	28
SP⁺/SK⁺/ SPK⁺ 100 VDS 063	**2**	26	49.6	41.1	26	24	59.1	55.174	0	90	9	120	45	30	10	101	95.5	51	21	9	39
SP⁺/SK⁺/ SPK⁺ 140 VDS 080	**3**	24	64.2	54.7	31	29	82.3	76.395	0	130	11	165	58	30	12	141	122	65.5	35.5	21	51

All dimensions in [mm]

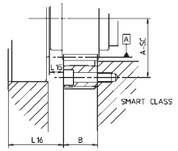
a) please contact us for precise dimensions; align mechanism recommended (alignment dimension ±0.3 mm)

z = Number of teeth
d_a = Tip diameter
d = Partial circle diameter
x = Profile correction





True running accuracy < 40 µm



Value Class pinion (shrunk/bonded) on **shaft key** with **Value** and **Smart Class rack**

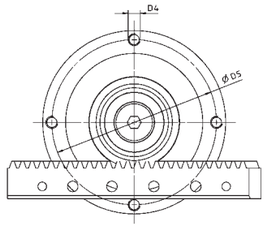
(all pinions, pressure angle α=20°, inclination angle β = 19,5283° left-handed)

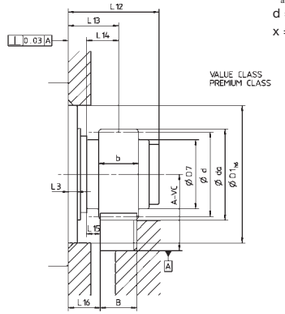
Key output	Module	z	A-VC ±0.3 a)	A-SC ±0.3 a)	b	B	d_a	d	x	$D1_{h6}$	D4	D5	D7	L3	L12	L13	L14	L15	L16
LP⁺/LK⁺/ LPK⁺ 070	**2**	18	41.9	33.4	26	24	43.7	38.197	0.4	52	M5	62	0	5	42	27	19	7	15
LP⁺/LK⁺/ LPK⁺ 090	**2**	22	45.7	37.2	26	24	51.4	46.686	0.2	68	M6	80	40	5	52	30	20	8	18
LP⁺/LK⁺/ LPK⁺ 120	**2**	26	49.6	41.1	26	24	59.1	55.174	0	90	M8	108	45	6	77.5	33	21	9	21
LP⁺/LK⁺/ LPK⁺ 155	**3**	24	64.2	54.7	31	29	82.3	76.395	0	120	M10	140	58	8	107	50.5	35.5	21	36

All dimensions in [mm]

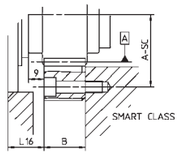
a) please contact us for precise dimensions; align mechanism recommended (alignment dimension ±0.3 mm)

z = Number of teeth
d_a = Tip diameter
d =Partial circle diameter
x = Profile correction





True running accuracy < 40 µm



SP⁺ gearhead with **Value Class pinion** on **shaft key** with **Value** and **Smart Class rack**

	Ratio	Module	z	F_{2T} [N] (lb_f) (VC)	F_{2T} [N] (lb_f) (SC)	T_{2B} [Nm] (in.lb) (VC)	T_{2B} [Nm] (in.lb) (SC)	$F_{2T\,Not}$ [N] (lb_f)	$T_{2\,Not}$ [Nm] (lb_f)	V_{Max} [m/min] (in/sec) i = 5	V_{Max} [m/min] (in/sec) i = 25	m_{pinion} [kg] (lb_m)
SP⁺ 060	3	2	18	1550 (338)	1550 (349)	30 (266)	30 (266)	3000 (675)	57 (505)	–	–	0.3 (0.67)
	10, 100	2	18	1650 (372)	1650 (372)	32 (284)	32 (284)	3000 (675)	57 (505)	–	–	0.3 (0.67)
	4–7 / 16–70	2	18	2000 (450)	2000 (450)	38 (337)	38 (337)	3000 (675)	57 (505)	144 (95)	29 (20)	0.3 (0.67)
SP⁺ 075	All	2	22	3500 (788)	3500 (788)	82 (726)	82 (726)	5000 (1125)	117 (1036)	176 (116)	35 (23)	0.4 (0.89)
SP⁺ 100	All	2	26	4300 (968)	5000 (1125)	119 (1054)	138 (1222)	8500 (1913)	234 (2071)	156 (103)	31 (21)	0.6 (1.33)
SP⁺ 140	All	3	24	8000 (1800)	9000 (2025)	306 (2709)	344 (3045)	16000 (3600)	611 (5408)	192 (126)	38 (25)	1.6 (3.54)

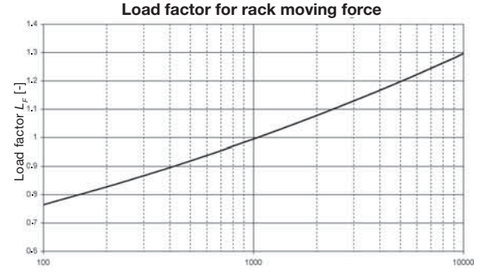
Technical data based on 1000 load cycles per hour.
More combinations possible with cymex®

F_{2T} = Max. moving force
T_{2B} = Max. acceleration torque
SC = Smart Class
VC = Value Class

In Z -axis without a balancing weight additional load changes can be caused due to additional movements in other axes.

Calculation including load factor:
$F_{2t} * L_F = F_{2t,\,LF} < F_{2T}$

Load factor for rack moving force



LP⁺ gearhead with **Value Class pinion** on **shaft key** with **Value** and **Smart Class rack**

	Ratio	Module	z	F_{2T} [N] (lb_f) (VC)	F_{2T} [N] (lb_f) (SC)	T_{2B} [Nm] (in.lb) (VC)	T_{2B} [Nm] (in.lb) (SC)	$F_{2T\,Not}$ [N] (lb_f)	$T_{2\,Not}$ [Nm] (lb_f)	V_{Max} [m/min] (in/sec) i = 5	V_{Max} [m/min] (in/sec) i = 25	m_{pinion} [kg] (lb_m)
LP⁺ 070	3, 10, 15, 30, 100	2	18	1700 (383)	1700 (383)	32 (284)	32 (284)	2700 (608)	52 (461)	–	–	0.3 (0.67)
	5, 7, 25, 50	2	18	1850 (417)	1850 (417)	35 (310)	35 (310)	2700 (608)	52 (461)	144 (95)	29 (20)	0.3 (0.67)
LP⁺ 090	3, 10, 15, 30, 100	2	22	3400 (765)	3400 (765)	79 (700)	79 (700)	4800 (1080)	112 (992)	–	–	0.4 (0.89)
	5, 7, 25, 50	2	22	3500 (788)	3500 (788)	82 (726)	82 (726)	4800 (1080)	112 (992)	176 (116)	35 (23)	0.4 (0.89)
LP⁺ 120	All	2	26	4100 (923)	4500 (1013)	113 (1001)	124 (1098)	7800 (1755)	215 (1903)	156 (103)	31 (21)	0.6 (1.33)
LP⁺ 155	All	3	24	6500 (1463)	7000 (1575)	248 (2195)	267 (2363)	14000 (3150)	535 (4735)	192 (126)	38 (25)	1.6 (3.54)

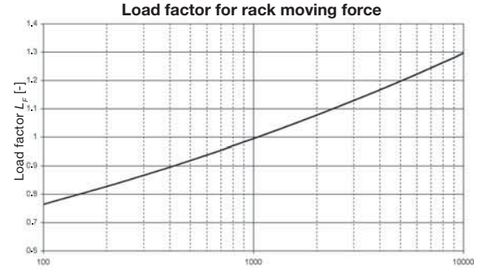
Technical data based on 1000 load cycles per hour.
More combinations possible with cymex®

F_{2T} = Max. moving force
T_{2B} = Max. acceleration torque
SC = Smart Class
VC = Value Class

In Z -axis without a balancing weight additional load changes can be caused due to additional movements in other axes.

Calculation including load factor:
$F_{2t} * L_F = F_{2t,\,LF} < F_{2T}$

Load factor for rack moving force



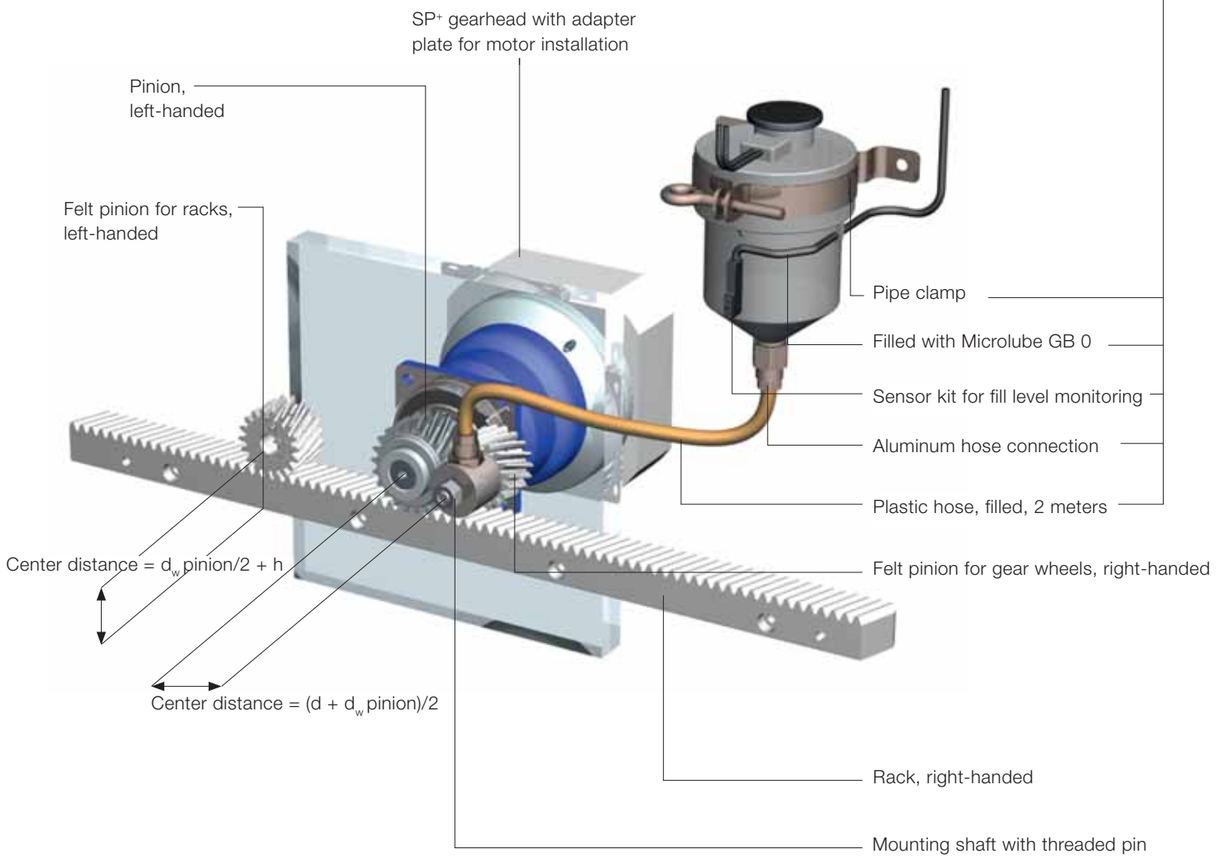
Perfect lubrication – **for a perfect system**

Efficient lubrication systems are essential in guaranteeing **a long service life** for our pinion and rack systems.
We offer you the right **felt pinions, fastening axles and lubricator sets,** adapted perfectly to our components. The lubricator supplies a preset quantity of grease to the felt pinion and guarantees a constant film of lubrication on the rack and pinion.

Complete lubrication system

Complete lubricator

Kit order number	Size
20021555	125
20022531	475



Replacement sensor for fill level monitoring

Lubricator type	Order number
125	20021557
475	20022535

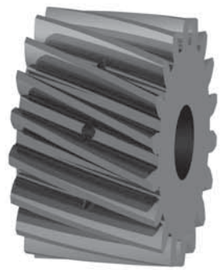
The **sensor kit for fill level monitoring** included in the lubricator set enables your machine to permanently monitor the fill level in the lubricator so you utilize it more efficiently.

Felt pinion, helical-toothed

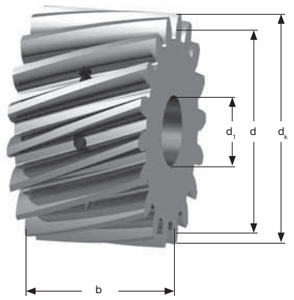
	Felt pinion							Fastening axle C					
	Module	Number of teeth	Order no.	d	d_1	d_k	b	Order no.	D	S	b	l	L
A	2	18 LH	20022364	38.2	12	42	25	20017836	30	M8	25.5	10	60
B	2	18 RH	20017681										
A	3	18 LH	20022359	57.3	12	63	30	20021477	30	M8	30.5	10	65
B	3	18 RH	20021473										
A	4	18 LH	20023115	76.4	12	84.4	40	20023119	30	M8	40.5	10	75
B	4	18 RH	20023106										
A	5	17 LH	20023116	90.2	20	100.2	50	20023120	50	M12	50.5	15	90
B	5	17 RH	20023111										
A	6	17 LH	20023117	108.2	20	120.2	60	20023121	50	M12	60.5	15	100
B	6	17 RH	20023113										

All dimensions in [mm]

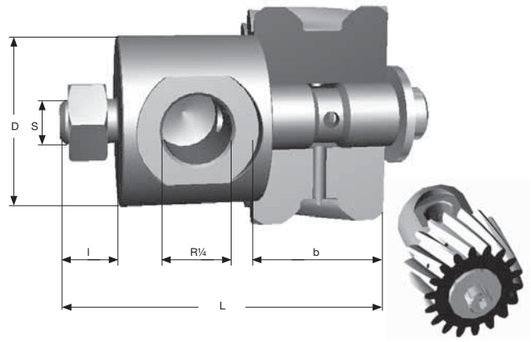
B Felt pinion for pinions, right-handed RH



A Felt pinion for Racks, left-handed LH



C Fastening axis for felt pinions

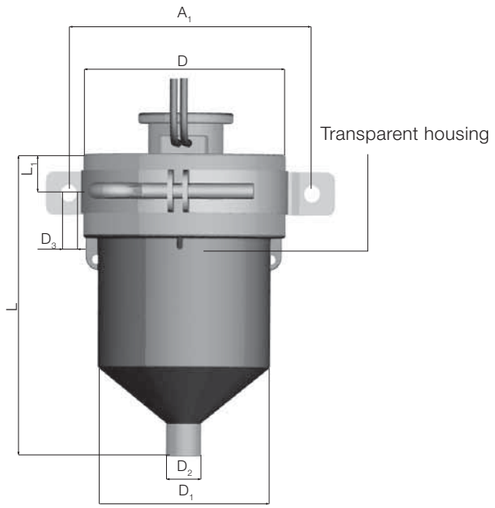


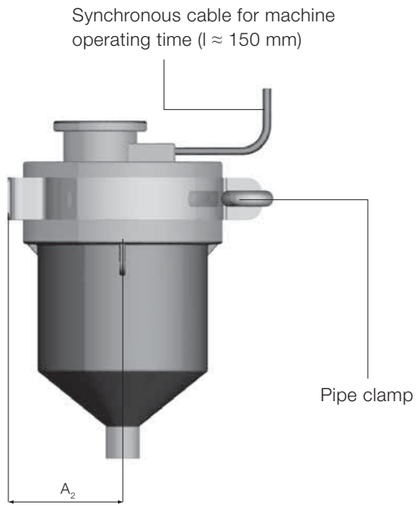
Dimensions of the lubricator

Kit order number	Size	D	D_1	D_2 [a]	D_3 [a]	L	L_1	A_1	A_2	Replacement lubricator [b]
20021555	125	80	68	R ¼"	6,5	114	13,5	95	48	20021556
20022531	475	115	103	R ½"	8,5	155	20	105	70	20022533

All dimensions in [mm]
[a] Lubricator connector
[b] No pipe clamp, hose, screw connection, synchronous cable or sensor kit

Nitrogen gas is generated in the electronically controlled lubricator. When the micro switches initiate the required dose, the nitrogen gas generated moves the piston continually. An emptying time of 1, 2, 3, 6, 12 or 18 months and individual lubricant quantities can be selected. Each product is supplied with detailed operating instructions.





Technical data of lubricator

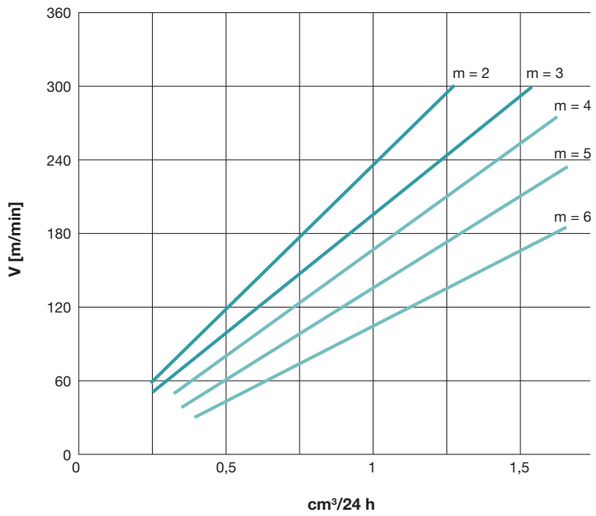
Lubricator type	125	475
Approx. capacity cm³	100	460
Connection thread	R ¼"	R ½"
Setting time	1, 2, 3, 6, 12 or 18 months	
Weight	370 g	1000 g
Pressure	0.2 to 3 bar	
Drive	2 x 1.5 V	4 x 1.5 V
Temperature range	10°C to 50°C	
Battery capacity	about 2000 mAh	about 4000 mAh
Battery consumption after 1 year	about 285 mAh	about 800 mAh
Grease filling	Klüber Microlube GB 0	
Accessories	Sensor, replacement lubricator	
Mounting position	Any	

Recommended lubrication

Depending on the conditions of use, it is possible to set the lubricator to various emptying times with a micro switch (1, 2, 3, 6,12 or 18 months).

Our recommendation for a constant movement speed of 90 m/min: for example, module 2: 0.175 to 0.35 cm³/day or module 3: 0.35 to 0.7 cm³/day

Grease dosing for felt pinion lubrication



Assembly accessories

You will need an assembly jig to align the transfers between the individual racks. You will also need a needle roller when making a final check with the dial gauge.

Assembly jig

Module	L	z	B	H	h
2	100	14	24	24	22
3	100	9	29	29	26
4	156	8	46	46	41
5	156	7	46	46	41
6	156	7	46	46	40

Needle roller

Module	Order number
2	20001001
3	20000049
4	20038001
5	20038002
6	20038003

Bolts and cylinder pins

(not included in the scope of delivery)

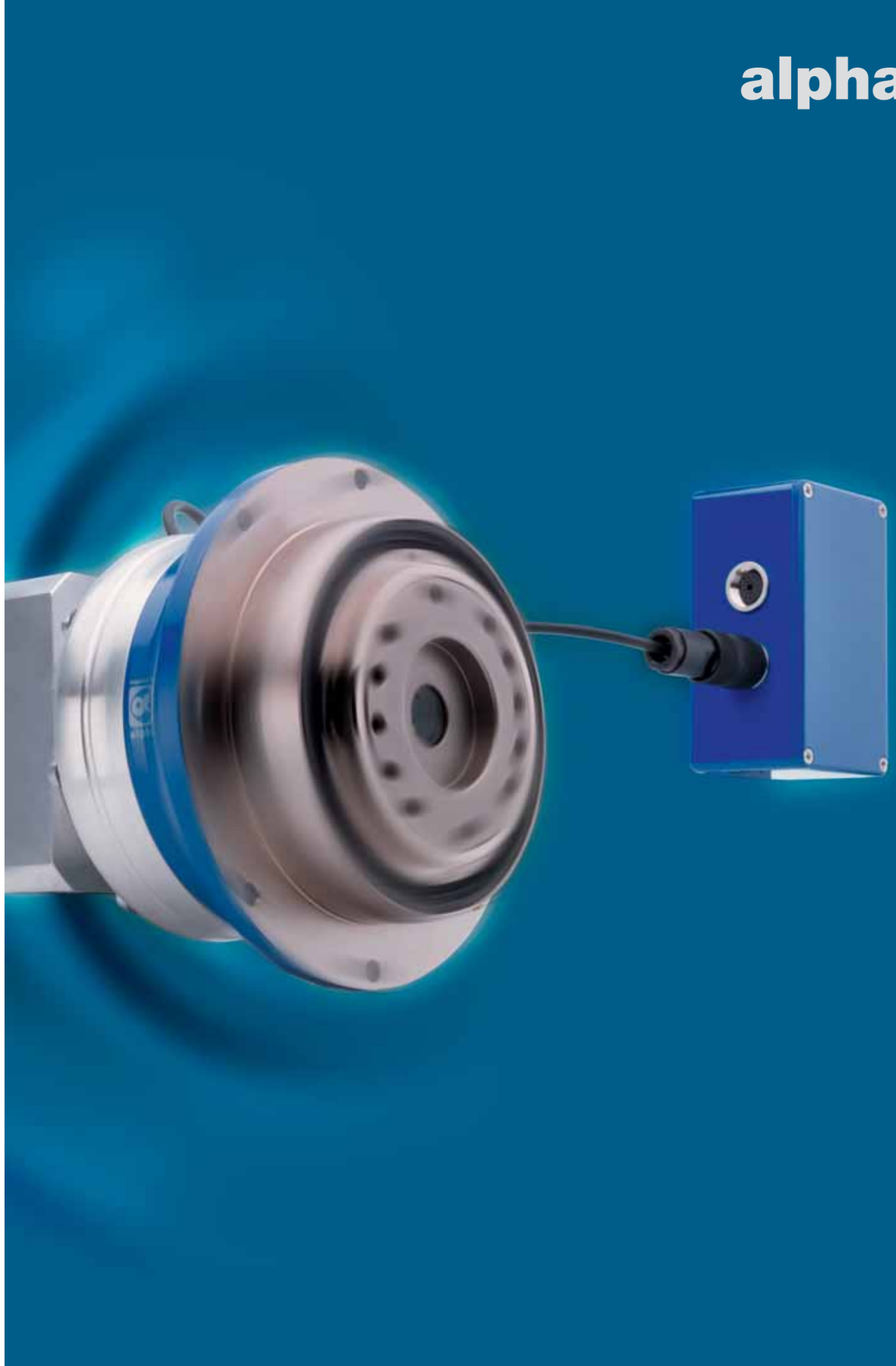
To fasten each rack, you will need bolts and cylinder pins specified in the table below. The length of the bolts and pins depends on the design of the machine bed.

Module	Length	Class			Bolt DIN EN ISO 4762–12.9 (quantity x thread)	Tightening torque		Quantity x cylinder pin DIN EN ISO 2338 / DIN EN ISO 2338 / Cylinder pin with inner thread DIN7979 / DIN EN ISO 8735, form A
		Premium	Smart	Value		(Nm)	(in.lb)	
2	1000			x	8 x M6	16.5	(147)	2 x 6 m6
2	500	x			4 x M6	16.5	(147)	2 x 6 m6
2	480		x		8 x M8	40	(354)	2 x 8 m6
2	333	x			4 x M6	16.5	(147)	2 x 6 m6
2	167	x			2 x M6	16.5	(147)	2 x 6 m6
3	1000			x	8 x M8	40	(354)	2 x 8 m6
3	500	x			4 x M8	40	(354)	2 x 8 m6
3	480		x		8 x M10	81	(717)	2 x 10 m6
3	250	x			2 x M8	40	(354)	2 x 8 m6
4	1000			x	8 x M8	40	(354)	2 x 8 m6
4	507	x			4 x M10	81	(717)	2 x 10 m6
4	480		x		8 x M12	140	(1239)	2 x 10 m6
5	1000			x	8 x M12	140	(1239)	2 x 12 m6
5	500	x			4 x M12	140	(1239)	2 x 12 m6
6	1000			x	8 x M16	220	(1947)	2 x 16 m6
6	500	x			4 x M16	220	(1947)	2 x 16 m6

alpha IQ – WITTENSTEIN alpha gearbox with integrated sensors – helping you better understand your processes

alpha IQ

Details



Understanding processes through **intelligent sensor gearboxes**
– low backlash planetary gearboxes + integrated sensors

Sensor gearboxes allow you to measure, diagnose and assess process parameters directly, i.e. all mechanical loads processed by the gearbox can be measured at the output drive.

Application areas of the sensor gearbox and **customer benefits**

Diagnosis

alpha IQ allows you to measure the forces generated in the existing application without modifying the machine design.
This measurement then forms the basis for optimization measures for the drive train design and allows you to select the **right drive system components** and verify calculations to save valuable resources.

Process monitoring

By measuring key parameters, sensor gearboxes provide a revealing insight into previously unknown process mechanisms.
A more accurate understanding of machine processes can be applied directly to **improve process stability**.

Process control

Measurements provide valuable information that can be used to control and optimize your manufacturing process in realtime.
This simple method for **optimizing processes** will impress your customers.

alpha IQ – Measured parameters

Sensor gearbox information

Gearbox
Low backlash planetary gearboxes of renowned WITTENSTEIN alpha quality

Sensors
Intelligent sensor technology integrated in the gearbox

Electronics box
Receives signals from the gearbox and serves as a communication and storage medium

Software
Calibration or display and evaluation software

Interfaces
RS232, voltage interface, current interface and field buses via gateway

Gearbox types and sizes
SP⁺ 075, SP⁺ 100, SP⁺ 140
TP⁺ 010, TP⁺ 025, TP⁺ 050

Couplings – precision transmission of movement

Couplings

Details

Safe torque limitation

Single position re-engagement – standard version

After the overload has been removed, the torque limiter can be re-engaged precisely 360 degrees from the original disengagement position.
A proven principle that guarantees synchronism. Signal in the event of an overload. Suitable for use in machine tools, packaging machines and automation systems.

Load holding version

In the event of an overload, the drive and the drive elements are not separated or are only allowed limited rotation. Guaranteed load safety. Automatic engagement of the torque limiter after the torque level has dropped. Signal in the event of an overload. Suitable for use on presses or load-lifting equipment.

Multi-position version

Coupling re-engages automatically at the very next ball detent. The coupling is immediately ready for operation again at several points after an overload. Immediate availability of the machine or plant as soon as the overload has been removed. Signal in the event of an overload. Standard engagement after 60 degrees. Optional engagement after 30, 45, 60, 90 and 120 degrees.

Full disengagement version

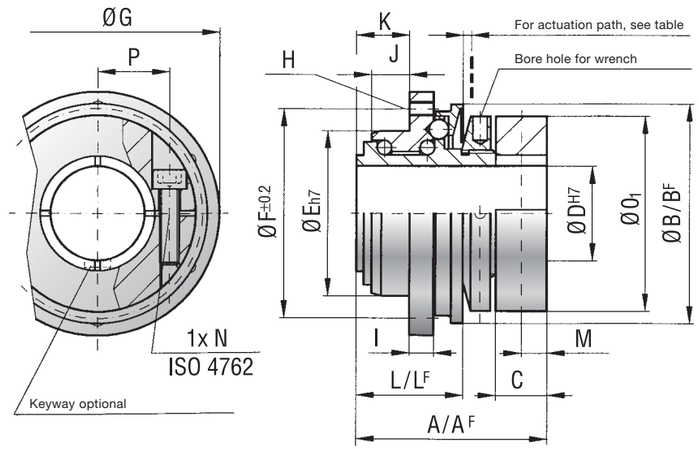
Permanent separation of the drive and the drive elements in the event of an overload. Spring flips over completely. No residual friction. Torque limiter can be re-engaged manually (re-engagement possible every 60 degrees).

TL1 – Torque limiter

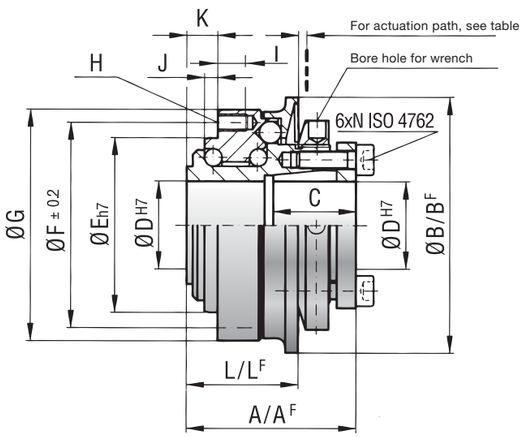
				Series													
				Miniature design series													
				1.5	2	4.5	10	15	30	60	150	200	300	500	800	1500	2500
Adjustment range from – to (approx. values)	T_{KN}	Nm	A	0.1–0.6	0.2–1.5	1–3	2–6	5–15	5–20	10–30	20–70	30–90	100–200	80–200	400–650	600–800	1500–2000
		in.lb		1-69	2-14	9-27	18-54	45-133	45-177	89-266	177-620	266-797	885-1770	708-1770	3540-5753	5310-7080	13275-17700
		Nm	B	0.4–1	0.5–2.2	2–4.5	4–12	12–25	10–30	25–80	45–150	60–160	150–240	200–350	500–800	700–1200	2000–2500
		in.lb		4-9	5-20	18-40	36-107	107-222	89-266	222-708	399-1328	531-1416	1328-2124	1770-3098	4425-7080	6195-10620	17700-22125
		Nm	C	0.8–2	1.5–3.5	3–7	7–18	20–40	20–60	50–115	80–225	140–280	220–440	320–650	650–950	1000–1800	2300–2800
		in.lb		8-18	14-31	27-62	62-160	177-354	177-531	443-1018	708-1992	1239-2478	1947-3894	2832-5753	5753-8408	8850-15930	20355-24780
		Nm	D	–	–	–	–	35–70	50–100	–	–	250–400	–	–	–	–	–
		in.lb						310-620	443-885			222-3540					
Adjustment range from – to (approx. values), full disengagement	T_{KN}	Nm	A	0.3–0.8	0.5–2	2.5–4.5	2–5	7–15	8–20	10–30	20–60	80–140	120–180	50–150	200–400	1000–1250	1400–2200
		in.lb		3-8	5-18	23-40	18-45	62-133	71-177	89-266	177-531	708-1239	1062-1593	443-1328	1770-3540	8850-11063	12390-19470
		Nm	B	0.6–1.3	–	–	4–10	–	16–30	20–40	40–80	130–200	160–300	100–300	450–850	1250–1500	1800–2700
		in.lb		6-12			36-89		142-266	177-354	354-708	1151-1770	1416-2655	885-2655	3983-7523	11063-13275	15930-23895
		Nm	C	–	–	–	8–15	–	–	30–60	80–150	–	–	250–500	–	–	–
		in.lb					71-133			266-531	708-1328			2213-4425			
Overall length	A	mm		23	28	32	39	40	50	54	58	63	70	84	95	109	146
Overall length, full disengagement	A^F	mm		23	28	32	39	40	50	54	58	66	73	88	95	117	152
Outer diameter of actuation ring	B	mm		23	29	35	45	55	65	73	92	99	120	135	152	174	242
Actuation ring Ø, full disengagement	B^F	mm		24	32	42	51.5	62	70	83	98	117	132	155	177	187	258
Clamping fit length	C	mm		7	8	11	11	19	22	27.5	32	32	41	41	49	61	80
Inner diameter from Ø to Ø H7	D	mm		4–8	4–12	5–14	6–20	8–22	12–22	12–29	15–37	20–44	25–56	25–56	30–60	35–70	50–100
Centering diameter h7	E	mm		14	22	25	34	40	47	55	68	75	82	90	100	125	168
Hole circle diameter ±0.2	F	mm		22	28	35	43	47	54	63	78	85	98	110	120	148	202
Flange diameter – 0.2	G	mm		26	32	40	50	53	63	72	87	98	112	128	140	165	240
Thread	H			4xM2	4xM2.5	6xM2.5	6xM3	6xM4	6xM5	6xM5	6xM6	6xM6	6xM8	6xM8	6xM10	6xM12	6xM16
Thread length	I	mm		3	4	4	5	6	8	9	10	10	10	12	15	16	24
Centering length – 0.2	J	mm		2.5	3.5	5	8	3	5	5	5	5	6	9	10	13.5	20
Distance	K	mm		5	6	8	11	8	11	11	12	12	15	21	19	25	34
Distance	L	mm		11	15	17	22	27	35	37	39	44	47	59	67	82	112
Distance, full disengagement	L^F	mm		11.5	16	18	24	27	37	39	41.5	47	51.5	62	75	91	120
Distance	M			2.5	4	4	5	–	–	–	–	–	–	–	–	–	–
Screws to ISO 4762	N			M2.5	M3	M4	M4	M4	M5	M5	M6	M6	M8	M8	M10	M12	M16
Tightening torque	N	Nm		1	2	4	4.5	4	6	8	12	14	18	25	40	70	120
		in.lb		9	18	36	40	36	54	71	107	124	160	222	354	620	1062
Outer diameter of clamping ring	O_1	mm		20	25	32	40	–	–	–	–	–	–	–	–	–	–
Diameter	O_2	mm		13	18	21	30	35	42	49	62	67	75	84	91	112	154
Diameter h7	O_3	mm		11	14	17	24	27	32	39	50	55	65	72	75	92	128
Distance between centers	P	mm		6.5	8	10	15	–	–	–	–	–	–	–	–	–	–
Distance	R	mm		1	1.3	1.5	1.5	2.5	2.5	2.5	2.5	3	3	4	4	4.5	6
Moment of inertia	J	10^{-3} kgm²		0.01	0.02	0.05	0.07	0.15	0.25	0.50	1.60	2.70	5.20	8.60	20	31.5	210
		in.lb.s².10^{-3}		0.0089	0.0177	0.0443	0.0620	0.1328	0.2213	0.4425	1.4161	2.3897	4.6024	7.6116	17.7014	27.8797	185.86
Approx. weight		kg		0.03	0.065	0.12	0.22	0.4	0.7	1.0	1.3	2.0	3.0	4.0	5.5	10	28
		lb		0.066	0.143	0.265	0.485	0.882	1.543	2.205	2.866	4.409	6.614	8.818	12.125	22.046	61.729
Actuation path		mm		0.7	0.8	0.8	1.2	1.5	1.5	1.7	1.9	2.2	2.2	2.2	2.2	3.0	3.0

A^F, B^F, L^F = Full disengagement version

Torque limiter TL1 (1.5 – 10)
With clamping hub



Torque limiter TL1 (15 – 2500)
With conical clamping hub



Torque limiter for timing belt and sprocket applications

Material:
High-strength, hardened steel.

Design:
Model TL1: 1.5 – 10 Nm (13.3 – 88.5 in.lb)
with split clamping hub.
Model TL1: 15 – 2500 Nm (132.8 – 22125 in.lb)
with conical clamping hub.

Temperature range: -30 to +120°C (-22 to 248°F)

Temperature peaks: up to +150°C (302°F)

Backlash:
Completely backlash-free as a result of the frictional clamp connection and patented preload.

Service life:
These torque limiters are permanent and maintenance-free as long as the performance limits are not exceeded.

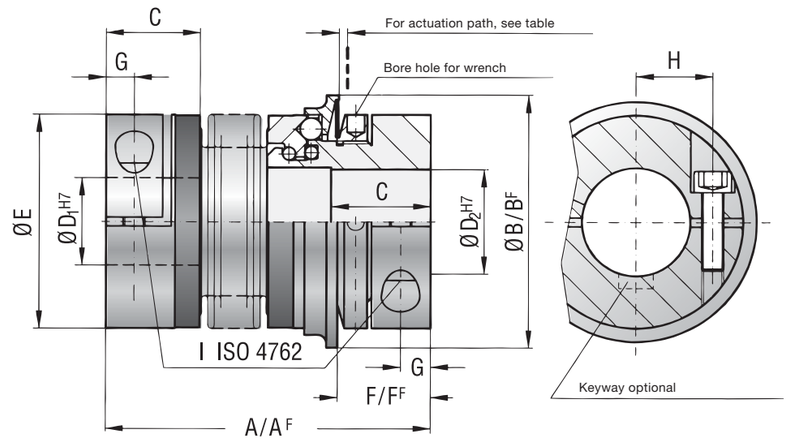
Fit tolerance: Tolerance between shaft and hub 0.01 – 0.05 mm

TL2 – Torque limiter

				Series																									
				1.5	2		4.5		10		15		30		60		80		150		200		300		500		800	1500
Length options (see ordering code)				A	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	A	A
Adjustment range from – to (approx. values)	T_{KN}	Nm	A	0.1–0.6	0.2–1.5		1–3		2–6		5–10		10–25		10–30		20–70		20–70		30–90		100–200		80–200		400–650	650–800
		in.lb		1-6	2-14		9-27		18-54		45-89		89-222		89-266		177-620		177-620		266-797		885-1770		708-1770		3540-5753	5753-7080
		Nm	B	0.4–1	0.5–2		3–6		4–12		8–20		20–40		25–28		30–90		45–150		60–160		150–240		200–350		500–800	700–1200
		in.lb		4-9	5-18		27-54		36-107		71-177		177-354		222-248		266-797		399-1328		531-1416		1328-2124		1770-3098		4425-7080	6195-10620
		Nm	C	0.8–1.5	–		–		–		–		–		–		–		80–180		120–240		200–320		300–500		650–850	1000–1800
		in.lb		8-14															708-1593		1062-2124		1770-2832		2655-4425		5753-7523	8850-15930
Adjustment range from – to (approx. values), full disengagement	T_{KN}	Nm	A	0.3–0.8	0.5–2		2.5–4.5		2–5		7–15		8–20		20–40		20–60		20–60		80–140		120–180		60–150		200–400	1000–1250
		in.lb		3-8	5-18		23-40		18-45		62-133		71-177		177-354		177-531		177-531		708-1239		1062-1593		531-1328		1770-3540	8850-11063
		Nm	B	0.6–1.3	–		–		5–10		–		16–30		30–60		40–80		40–80		130–200		180–300		100–300		450–800	1250–1500
		in.lb		6-12					45-89				142-266		266-531		354-708		354-708		1151-1770		1593-2655		885-2655		3983-7080	11063-13275
		Nm	C	–	–		–		–		–		–		–		–		80–150		–		–		250–500		–	–
		in.lb																	708-1328						2213-4425			
Overall length	A	mm		42	46	51	57	65	65	74	75	82	87	95	102	112	115	127	116	128	128	140	139	153	163	177	190	223
Overall length, full disengagement	A^F	mm		42	46	51	57	65	65	74	75	82	87	95	102	112	117	129	118	130	131	143	142	156	167	181	201	232
Actuation ring Ø	B	mm		23	29		35		45		55		65		73		92		92		99		120		135		152	174
Actuation ring Ø, full disengagement	B^F	mm		24	32		42		51.5		62		70		83		98		98		117		132		155		177	187
Fit length	C	mm		11	13		16		16		22		27		31		35		35		40		42		51		48	67
Inner diameter from Ø to Ø H7	D_1/D_2	mm		3–8	4–12		5–14		6–20		10–26		12–30		15–32		19–42		19–42		24–45		30–60		35–60		40–75	50–80
Outer diameter of coupling	E	mm		19	25		32		40		49		55		66		81		81		90		110		123		134	157
Distance	F	mm		12	13		15		17		19		24		30		31		31		35		35		45		50	65
Distance, full disengagement	F^F	mm		11.5	12		14		16		19		22		29		31		30		33		35		43		54	61
Distance	G	mm		3.5	4		5		5		6.5		7.5		9.5		11		11		12.5		13		17		18	22.5
Distance between centers	H	mm		6	8		10		15		17		19		23		27		27		31		39		41		2x48	2x55
Screws to ISO 4762	I			M2.5	M3		M4		M4		M5		M6		M8		M10		M10		M12		M12		M16		2xM16	2xM20
Tightening torque	I	Nm		1	2		4		4.5		8		15		40		50		70		120		130		200		250	470
		in.lb		9	18		36		40		71		133		354		443		620		1062		1151		1770		2213	4160
Approx. weight		kg		0.035	0.07		0.2		0.3		0.4		0.6		1.0		2.0		2.4		4.0		5.9		9.6		14	21
		lb		0.08	0.15		0.44		0.66		0.88		1.32		2.21		4.41		5.30		8.82		13.1		21.2		30.9	46.3
Moment of inertia	J	10^{-3} kgm²		0.01	0.01	0.01	0.02	0.02	0.06	0.07	0.10	0.15	0.27	0.32	0.75	0.80	1.80	1.90	2.50	2.80	5.10	5.30	11.5	11.8	22.8	23.0	42.0	83.0
		10^{-3} in.lb.s²		0.0089	0.0089	0.0089	0.0177	0.0177	0.0531	0.0620	0.0885	0.1328	0.2390	0.2832	0.6638	0.7081	1.59	1.68	2.21	2.48	45.1	46.9	10.2	10.4	20.2	20.4	37.2	73.5
Torsional rigidity	C_T	10^{-3} Nm/rad		0.7	1.2	1.3	7	5	9	8	20	15	39	28	76	55	129	85	175	110	191	140	420	350	510	500	780	1304
Lateral misalignment		mm		0.15	0.15	0.20	0.20	0.25	0.20	0.30	0.15	0.20	0.20	0.25	0.20	0.25	0.20	0.25	0.20	0.25	0.25	0.30	0.25	0.30	0.30	0.35	0.35	0.35
Angular misalignment		degrees		1	1	1.5	1.5	2	1.5	2	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5	1.5	2	1.5	2	2	2.5	2.5	2.5
Lateral spring stiffness		N/mm		70	40	30	290	45	280	145	475	137	900	270	1200	420	920	255	1550	435	2040	610	3750	1050	2500	840	2000	3600
Actuation path		mm		0.7	0.8		0.8		1.2		1.5		1.5		1.7		1.9		1.9		2.2		2.2		2.2		2.2	3.0

A^F, B^F, L^F = Full disengagement version
Smaller sizes on request

Torque limiter TL2
With clamping hub



Torque limiter for direct drives

Material:
Bellows made of highly flexible stainless steel. Safety section made of high-strength, hardened steel. Clamping hub material: up to series 80 aluminum and from series 150 steel.

Design:
With clamping hubs and a single lateral screw to ISO 4762.

Temperature range: -30 to +120°C (-22 to 248 °F)

Backlash:
Completely backlash-free as a result of the frictional clamp connection and patented preload.

Service life:
These torque limiters are permanent and maintenance-free as long as the performance limits are not exceeded.

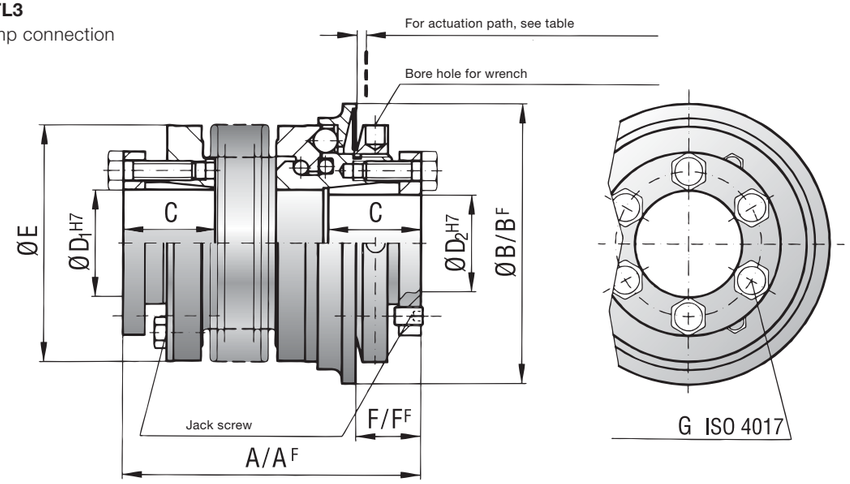
Fit tolerance: Tolerance between shaft and hub 0.01 – 0.05 mm

TL3 – Torque limiter

				Series																			
				15		30		60		150		200		300		500		800		1500	2500
Length options (see ordering code)				A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	A
Adjustment range from – to (approx. values)	T_{KN}	Nm	A	5–10		10–25		10–30		20–70		30–90		100–200		80–200		400–650		650–850	1500–2000
		in.lb		45-89		89-222		89-266		177-620		266-797		885-1770		708-1770		3540-5753		5753-7523	13275-17700
		Nm	B	8–20		20–40		25–80		45–150		60–160		150–240		200–350		500–800		700–1200	2000–2500
		in.lb		71-177		177-354		222-708		399-1328		531-1416		1328-2124		1770-3098		4425-7080		6195-10620	17700-22125
		Nm	C	–		–		–		80–200		140–280		220–400		300–500		600–900		1000–1800	2300–2800
		in.lb								708-1770		1239-2478		1947-3540		2655-4425		5310-7965		8850-15930	20355-24780
Adjustment range from to (approx. values), full engagement	T_{KN}	Nm	A	7–15		8–20		20–40		20–60		80–140		120–180		60–150		200–400		1000–1250	1400–2200
		in.lb		62-133		71-177		177-354		177-531		708-1239		1062-1593		531-1328		1770-3540		8850-11063	12390-19470
		Nm	B	–		16–30		30–60		40–80		130–200		180–300		100–300		450–800		1250–1500	1800–2700
		in.lb				142-266		266-531		354-708		1151-1770		1593-2655		885-2655		3983-7080		11063-13275	15930-23895
		Nm	C	–		–		–		80–150		–		–		250–500		–		–	–
		in.lb								708-1328						2213-4425					
Overall length	A	mm		62	69	72	80	84	94	93	105	99	111	114	128	123	136	151		175	246
Overall length, full disengagement	A^F	mm		62	69	72	80	84	94	93	105	102	114	117	131	127	140	151		184	252
Actuation ring Ø	B	mm		55		65		73		92		99		120		135		152		174	243
Actuation ring Ø, full disengagement	B^F	mm		62		70		83		98		117		132		155		177		187	258
Fit length	C	mm		19		22		27		32		32		41		41		49		61	80
Inner diameter from Ø to Ø H7	D_1/D_2	mm		10–22		12–23		12–29		15–37		20–44		25–56		25–60		30–60		35–70	50–100
Outer diameter of coupling	E	mm		49		55		66		81		90		110		123		133		157	200
Distance	F	mm		13		16		18		19		19		23		25		31		30	34
Distance, full disengagement	F^F	mm		13		14		17		18		17		20		22		20		26	31
6 x screws to ISO 4017	I			M4		M5		M5		M6		M6		M8		M8		M10		M12	M16
Tightening torque	I	Nm		4		6		8		12		14		18		25		40		70	120
		in.lb		36		54		71		107		124		160		222		354		620	1062
Approx. weight		kg		0.3		0.4		1.2		2.3		3.0		5.0		6.5		9.0		16.3	35
		lb		0.66		0.88		2.65		5.07		6.61		11.0		14.3		19.8		35.9	77.2
Moment of inertia	J	10^{-3} kgm²		0.10	0.15	0.28	0.30	0.75	0.80	1.90	2.00	2.80	3.00	5.50	6.00	11.0	12.8	20.00		42.00	257
		10^{-3} in.lb.s²		0.0885	0.1328	0.2478	0.2655	0.6638	0.7081	1.68	1.77	2.48	2.66	4.87	5.31	9.74	11.3	17.7		37.2	227.5
Torsional rigidity	C_T	10^3 Nm/rad		20	15	39	28	76	55	175	110	191	140	420	350	510	500	780		1304	3400
Lateral misalignment		mm		0.15	0.20	0.20	0.25	0.20	0.25	0.20	0.25	0.25	0.30	0.25	0.30	0.30	0.35	0.35		0.35	0.35
Angular misalignment		degrees		1	1.5	1	1.5	1	1.5	1	1.5	1.5	2	1.5	2	2	2.5	2.5		2.5	2.5
Lateral spring stiffness		N/mm		475	137	900	270	1200	380	1550	435	2040	610	3750	1050	2500	840	2000		3600	6070
Actuation path		mm		1.5		1.5		1.7		1.9		2.2		2.2		2.2		2.2		3	3

A^F, B^F, F^F = Full disengagement version

Torque limiter TL3
With conical clamp connection



Torque limiter for direct drives

Material:
Bellows made of highly flexible stainless steel. Safety section made of high-strength, hardened steel. Hub material: steel.

Design:
With split conical clamping hubs and captive jack screws.

Temperature range: -30 to +120°C (-22 to 248 °F)

Backlash:
Completely backlash-free as a result of the frictional clamp connection and patented preload.

Service life:
These torque limiters are permanent and maintenance-free as long as the performance limits are not exceeded.

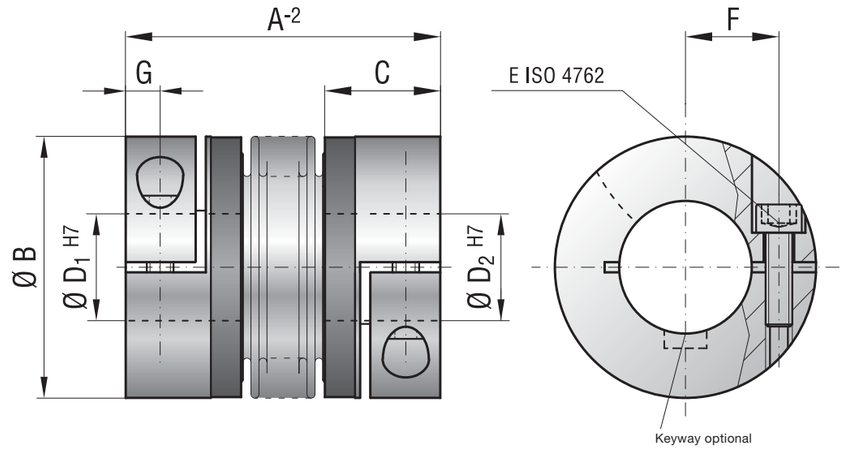
Fit tolerance: Tolerance between shaft and hub 0.01 – 0.05 mm

BC2 – Bellows coupling

			Series																					
			15		30		60		80		150		200		300		500		800	1500
Length options (see ordering code)			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	A
Rated torque	T_{KN}	Nm	15		30		60		80		150		200		300		500		800	1500
		in.lb	133		266		531		708		1328		1770		2655		4425		7080	13275
Overall length	*A*	mm	59	66	69	77	83	93	94	106	95	107	105	117	111	125	133	146	140	166
Outer diameter	*B*	mm	49		55		66		81		81		90		110		124		134	157
Fit length	*C*	mm	22		27		31		36		36		41		43		51		45	55
Inner diameter from Ø to Ø H7	D_1/D_2	mm	8–28		10–30		12–32		14–42		19–42		22–45		24–60		35–60		40–75	50–80
Fastening screws to ISO 4762	*E*		M5		M6		M8		M10		M10		M12		M12		M16		2xM16[a]	2xM20[a]
Tightening torque of fastening screws	*E*	Nm	8		15		40		50		70		120		130		200		250	470
		in.lb	71		133		354		443		620		1062		1151		1770		2213	4160
Distance between centers	*F*	mm	17		19		23		27		27		31		39		41		2x48	2x55
Distance	*G*	mm	6.5		7.5		9.5		11		11		12.5		13		16.5		18	22.5
Moment of inertia	*J*	10^{-3} kgm²	0.05	0.07	0.12	0.13	0.32	0.35	0.8	0.85	1.9	2	3.2	3.4	7.6	7.9	14.3	14.6	16.2	43.5
		10^{-3} in.lb.s²	0.0443	0.0620	0.1062	0.1151	0.2832	0.3098	0.7081	0.7523	1.68	1.77	2.83	3.01	6.73	6.99	12.66	12.92	14.34	38.50
Hub material (standard) (steel on request)			Al		Al		Al		Al		Steel		Steel		Steel		Steel		Steel	Steel
Approx. weight		kg	0.16		0.26		0.48		0.8		1.85		2.65		4		6.3		5.7	11.5
		lb	0.353		0.573		1.764		1.764		4.079		5.842		8.818		13.889		12.566	25.353
Torsional rigidity	C_T	10^3 Nm/rad	20	15	39	28	76	55	129	85	175	110	191	140	450	350	510	500	780	1304
Axial misalignment	*max. values*	mm	1	2	1	2	1.5	2	2	3	2	3	2	3	2.5	3.5	2.5	3.5	3.5	3.5
Lateral misalignment	*max. values*	mm	0.15	0.2	0.2	0.25	0.2	0.25	0.2	0.25	0.2	0.25	0.25	0.3	0.25	0.3	0.3	0.35	0.35	0.35
Axial spring stiffness	C_a	N/mm	25	15	50	30	72	48	48	32	82	52	90	60	105	71	70	48	100	320
Lateral spring stiffness	C_r	N/mm	475	137	900	270	1200	420	920	290	1550	435	2040	610	3750	1050	2500	840	2000	3600

[a] Two screws per clamping hub, 180° apart
Max. angular misalignment 1.5°

Bellows coupling BC2
With clamping hub



Bellows coupling for direct drives

Material:
Bellows made of highly flexible stainless steel. Hub material: see table below.

Design:
With clamping hubs and a single lateral screw to ISO 4762. Any imbalance of the clamping hubs due to the design is compensated by balancing bores located on the hub interior.

Temperature range: -30 to +120°C (-22 to 248 °F)

Backlash:
Completely backlash-free as a result of the frictional clamp connection.

Service life:
These torque limiters are permanent and maintenance-free as long as the performance limits are not exceeded.

Fit tolerance: Tolerance between shaft and hub 0.01 – 0.05 mm

Speeds:
Up to 10,000 rpm / in excess of 10,000 rpm with finely balanced version.

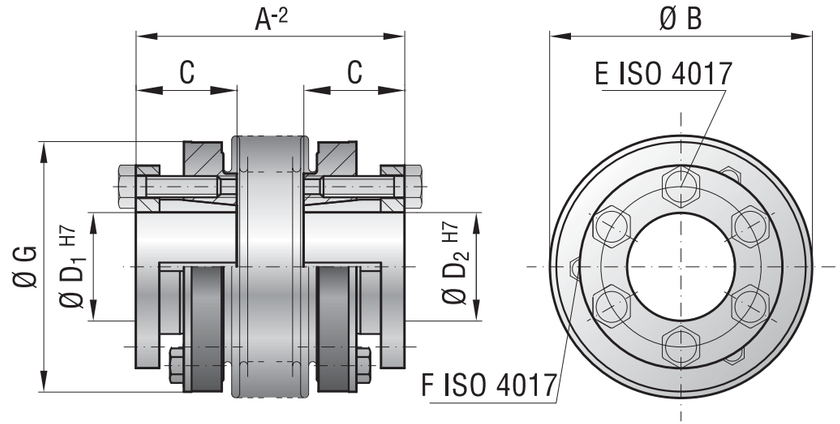
Brief overload: Acceptable up to 1.5 times the value specified.

BC3 – Bellows coupling

			Series																			
			15		30		60		150		200		300		500		800	1500	4000	6000	10000
Length options (see ordering code)			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	A	A	A	A
Rated torque	T_{KN}	Nm	15		30		60		150		200		300		500		800	1500	4000	6000	10000
		in.lb	133		266		531		1328		1770		2655		4425		7080	13275	35400	53100	88500
Overall length without screw head	A	mm	48	55	57	65	66	76	75	87	78	90	89	103	97	110	114	141	195	210	217
Outer diameter	B	mm	49		55		66		81		90		110		124		133	157	200	253	303
Fit length	C	mm	19		22		27		32		32		41		41		50	61	80	85	92
Inner diameter from Ø to Ø H7	D_1/D_2	mm	10–22		12–23		12–29		15–38		15–44		24–56		24–60		30–60	35–70	50–100	60–140	70–180
6 x fastening screws to ISO 4017	E		M4		M5		M5		M6		M6		M8		M8		M10	M12	M16	M16	8xM16
Tightening torque of fastening screws	E	Nm	4		6		8		12		14		18		25		40	70	120	150	160
		in.lb	36		54		71		107		124		160		222		354	620	1062	1328	1416
3 x jack screws to ISO 4017	F		M4		M4		M5		M5		M6		M6		M6		M6	6xM8	6xM10	6xM10	8xM10
Outer diameter of hub	G	mm	49		55		66		81		90		110		122		116	135	180	246	295
Moment of inertia	J	10^{-3} kgm²	0.12	0.59	0.3	0.34	0.54	0.73	1.2	1.6	1.7	2.5	5.1	5.9	9.1	9.9	13.2	34.9	85.5	254	629
		10^{-3} in.lb.s²	0.1062	0.5222	0.2655	0.3009	0.4779	0.6461	1.06	1.41	1.50	2.21	4.51	5.22	8.05	8.76	11.7	30.9	75.7	224.8	556.7
Approx. weight		kg	0.25		0.4		0.8		1.2		1.8		3		4.2		5.6	8.2	23	32.6	45.5
		lb	0.551		0.882		1.76		2.65		3.97		6.61		9.33		12.3	18.1	50.7	71.9	100.3
Torsional rigidity	C_T	10^3 Nm/rad	20	15	39	28	76	55	175	110	191	140	450	350	510	500	780	1304	3400	5700	10950
Axial misalignment	*max. values*	mm	1	2	1	2	1.5	2	2	3	2	3	2.5	3.5	2.5	3.5	3.5	3.5	3.5	3	3
Lateral misalignment	*max. values*	mm	0.15	0.2	0.2	0.25	0.2	0.25	0.2	0.25	0.25	0.3	0.25	0.3	0.3	0.35	0.35	0.35	0.4	0.4	0.4
Axial spring stiffness	C_a	N/mm	25	15	50	30	72	48	82	52	90	60	105	71	70	48	100	320	565	1030	985
Lateral spring stiffness	C_r	N/mm	475	137	900	270	1200	420	1500	435	2040	610	3750	1050	2500	840	2000	3600	6070	19200	21800

Max. angular misalignment 1.5°

Bellows coupling BC3
With conical connection



Bellows coupling for direct drives

Material:
Bellows made of highly flexible stainless steel. Hub material: steel.

Design:
With split conical clamping hubs and strong, captive jack screws to ISO 4017.

Temperature range: -30 to +120°C (-22 to 248°F)

Backlash:
Completely backlash-free as a result of the frictional clamp connection.

Service life:
These torque limiters are permanent and maintenance-free as long as the performance limits are not exceeded.

Fit tolerance: Tolerance between shaft and hub 0.01 – 0.05 mm

Speeds:
Up to 10000 rpm / in excess of 10000 rpm with finely balanced version.

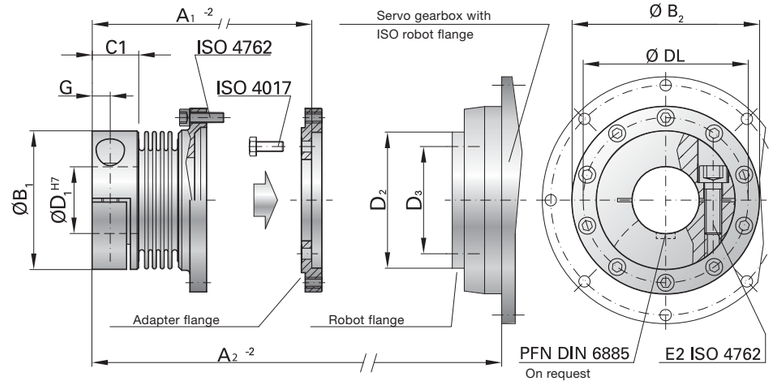
Brief overload: Acceptable up to 1.5 times the value specified.

BCT – Bellows coupling

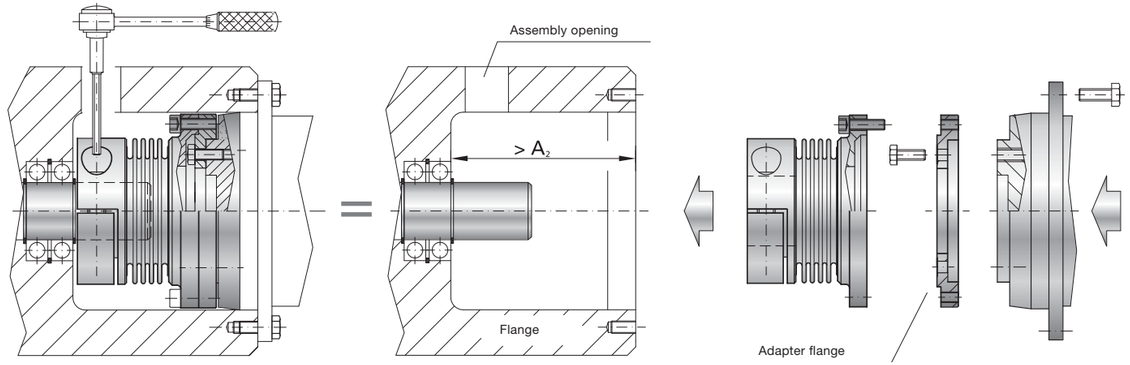
			Series				
			15	**60**	**150**	**300**	**1500**
Gearhead output type			TP004	TP010	TP025	TP050	TP110
Centering diameter	D_2	mm	40 h7	63 h7	80 h7	100 h7	160 h7
TP flange hole circle diameter / thread	D_3	mm	31.5 8 x M5	50 8 x M6	63 12 x M6	80 12 x M8	125 12 x M10
Nominal torque	T_{KN}	Nm	40	140	220	400	1570
		in.lb	354	1239	1947	3540	13895
Length 2	A_1	mm	49	67	72	90	140
Length installation space 2	A_2	mm	68	97	101	128	190
Hub diameter	B_1	mm	49	66	82	110	157
Flange diameter	B_2	mm	63.5	86.5	108	132	188
Fit length	C_1	mm	16.5	23	27.5	34	55
Possible inner diameter from Ø to Ø H7	D_1	mm	12 - 28	14 - 35	19 - 42	24 - 60	50 - 80
Hole circle diameter / Thread	DL	mm	56.5 10 x M4	76 10 x M5	97 10 x M6	120 12 x M6	170 16 x M8
Screws to ISO 4762	E		1 x M5	1 x M8	1 x M10	1 x M12	2 x M20
Tightening torque of fastening screw	E	Nm	8	45	80	120	470
		in.lb	71	399	708	1062	4160
Distance	G	mm	6.5	9.5	11	13	22.5
Approx. weight	I	kg	0.3	0.7	1	2.8	10
		lb	0.67	1.55	2.21	6.18	22.05
Torsional rigidity	C_T	10^3 Nm/rad	23	72	141	536	1304
		10^3 lb/rad	204	637	1248	4744	11540
Moment of inertia	J	10^{-3} kgm²	0.15	0.65	1.3	5.5	45
		10^{-3} in.lb.s²	0.14	0.58	1.16	4.87	39.83
Axial misalignment	Max. values mm		1	1.5	2	2.5	3
Lateral misalignment	Max. values mm		0.25	0.25	0.25	0.25	0.2

Max. angular misalignment 1°

Low backlash metal bellows coupling BCT
With flange connection



Installation and removal



Bellows coupling for direct drives

Material:
Hub: Series 15-150 high-strength alu,
Series: 300-1500 steel,
Bellows: High-strength stainless steel,
Adapter flange: Steel

Design:
Load side: With clamping hubs and a single lateral screw to ISO 4762.
Gearbox side: With flange connection and separate adapter flange.

Temperature range: -30 to +120°C, (-22 to 248°F)

Fit tolerance: Tolerance between shaft and hub 0.01 – 0.05 mm

Speeds:
Up to 10000 rpm

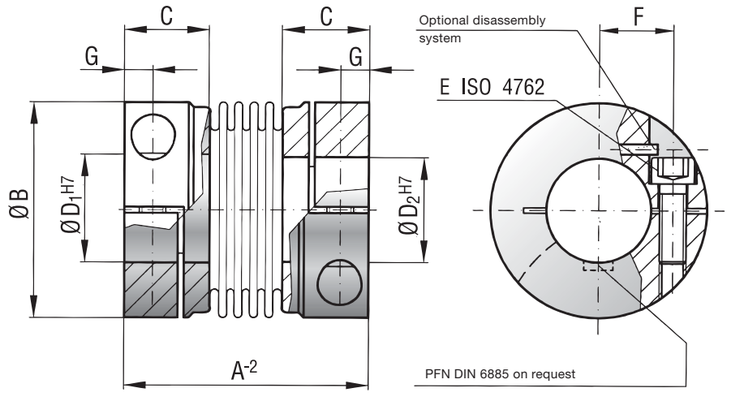
Non-standard applications:
Custom designs with different tolerances, keyways, non-standard material, bellows are available at short notice.

EC2 – Bellows coupling

			Series													
			2	4.5	10	15	30	60	80	150		300		500	
Length options see ordering code			A	A	A	A	A	A	A	A	B	A	B	A	B
Rated torque	T_{KN}	Nm	2	4.5	10	15	30	60	80	150		300		500	
		in.lb	18	40	89	133	266	531	708	1328		2655		4425	
Overall length	A	mm	30	40	44	58	68	79	92	92		109		114	
Outer diameter	B	mm	25	32	40	49	56	66	82	82		110		123	
Fit length	C	mm	10.5	13	13	21.5	26	28	32.5	32.5		41		42.5	
Inner diameter from Ø to Ø H7	D_1/D_2	mm	4–12.7	6–16	6–24	8–28	12–32	14–35	16–42	19–42		24–60		35–62	
Fastening screws to ISO 4762	E		M3	M4	M4	M5	M6	M8	M10	M10		M12		M16	
Tightening torque of fastening screw	E	Nm	2.3	4	4.5	8	15	40	70	85		120		200	
		in.lb	21	36	40	71	133	354	620	753		1062		1770	
Distance between centers	F	mm	8	11	14	17	20	23	27	27		39		41	
Distance	G	mm	4	5	5	6.5	7.5	9.5	11	11		13		17	
Moment of inertia	J	10^{-3} kgm²	0.002	0.007	0.016	0.065	0.12	0.3	0.75	1.8	0.8	7.5	3.8	11.7	4.9
		10^{-3} in.lb.s²	0.0018	0.0062	0.0142	0.0575	0.1062	0.2655	0.6638	1.59	0.71	6.64	3.36	10.36	4.34
Hub material			Al	Al	Al	Al	Al	Al	Al	Steel	Al	Steel	Al	Steel	Al
Approx. weight		kg	0.02	0.05	0.06	0.16	0.25	0.4	0.7	1.7	0.75	3.8	1.6	4.9	2.1
		lb	0.044	0.110	0.132	0.353	0.551	0.882	1.54	3.75	1.65	8.38	3.53	10.80	4.63
Torsional rigidity	C_T	10^3 Nm/rad	1.5	7	9	23	31	72	80	141		157		290	
Axial misalignment	*max. values*	mm	0.5	1	1	1	1	1.5	2	2		2		2.5	
Lateral misalignment	*max. values*	mm	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		0.2		0.2	
Axial spring stiffness	C_a	N/mm	8	35	30	30	50	67	44	77		112		72	
Lateral spring stiffness	C_r	N/mm	50	350	320	315	366	679	590	960		2940		1450	

Max. angular misalignment 1°

Bellows coupling EC2
With clamping hub



Bellows coupling for direct drives

Material:
Bellows made of highly flexible stainless steel. Hub material: see table below.

Design:
With clamping hubs and a single lateral screw to ISO 4762.

Temperature range: -30 to +100°C (-22 to 212°F)

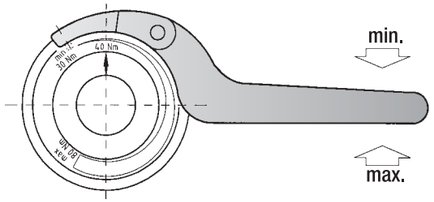
Backlash:
Completely backlash-free as a result of the frictional clamp connection.

Service life:
These torque limiters are permanent and maintenance-free as long as the performance limits are not exceeded.

Fit tolerance: Tolerance between shaft and hub 0.01 – 0.05 mm

Optional self-opening clamp system:
For expanding the bore hole during assembly or dismantling.

Torque adjusting wrench for DIN 1816 nuts

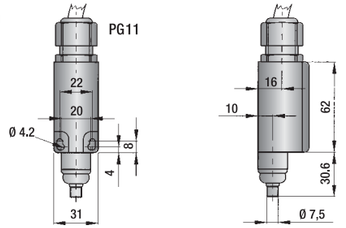


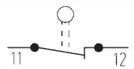
Smaller coupling sizes do not require a torque adjusting wrench. The adjusting nuts for the 1.5 / 2 / 4.5 / 10 series can be adjusted with a bolt or pin.

Series			Torque adjusting wrench
15			AC 20022992
20/30	40/60	80/150	AC 20022993
200			AC 20022994
300			AC 20022995
500			AC 20022996
800	1500	2500	AC 20022997

Mechanical limit switch (emergency cut-off)

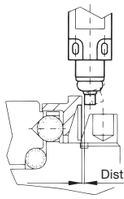
Dimension drawings



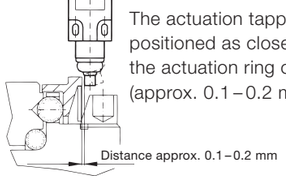
Technical data	
Max. voltage:	500 V AC
Max. constant current:	10 A
Degree of protection:	IP 65
Contact type:	NC contact (positive opening)
Ambient temperature:	-30 to +80 ‹C
Actuation:	Tappet (metal)
Circuit symbol:	

The mechanical limit switch is suitable for size 30 and above.

Important:
Always carry out a 100 % test of the switch function after assembly.

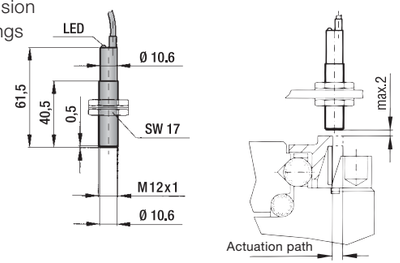


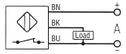
The actuation tappet should be positioned as close as possible to the actuation ring of the torque limiter (approx. 0.1 – 0.2 mm).



Proximity switch (emergency cut-off)

Dimension drawings



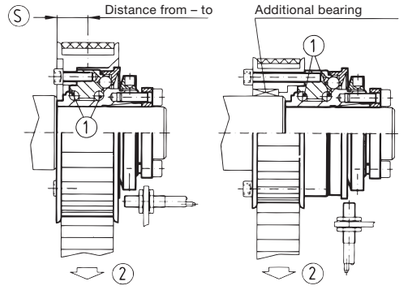
Technical data	
Voltage range:	10 to 30 V DC
Max. output current:	200 mA
Max. switching frequency:	800 Hz
Temperature range:	-25 to +70 °C
Degree of protection:	IP 67
Switch type:	PNP NC contact
Detection gap:	max. 2 mm
Circuit symbol:	

Important:
Always carry out a 100 % test of the switch function after assembly.

Assembly instructions for low backlash torque limiters

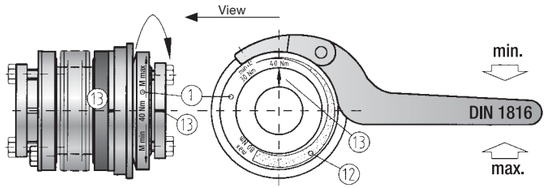
For the TL 1 – TL 3 models, the fit tolerance between the shaft and hub must be between 0.01 and 0.05 mm. Ensure that the coupling hub mounts smoothly on the shaft prior to assembly. Lightly oil the shaft prior to assembly. Do not use oils or grease with sliding additives (for example, MoS_2). Any keyways in the shaft will not affect the functioning of the clamp connection.

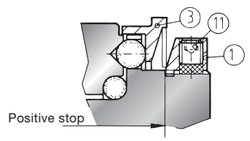
Model TL1 has an integrated **bearing (1)** for the attached component (for example, a pulley or sprocket wheel). Do not exceed the **maximum radial force (2)**, (see table). By centering the load between the **dimension (S)**, sufficient force is applied between the two balls and no separate bearings are required. Additional bearings are required for offset mounting. This is recommended, for example, if the attached component has a very small diameter or a very large width. Ball bearings, needle bearings or bushings can be used depending on the installation situation.



Series	1.5	2	4.5	10	15	30	60	150	200	300	500	800	1500	2500
Max. radial load capacity (N)	50	100	200	500	1400	1800	2300	3000	3500	4500	5600	8000	12000	20000
(S) from – to	3–6	5–8	5–11	6–14	7–17	10–24	10–24	12–24	12–26	12–28	16–38	16–42	20–50	28–60

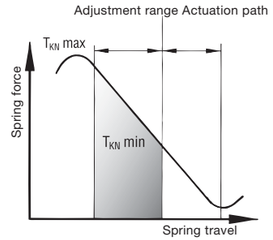
Adjustment of the disengagement torque





① Adjustment nut
⑪ Locking screw
③ Steel actuation ring
⑫ Adjustment range
⑬ Marking

WITTENSTEIN alpha torque limiters are factory adjusted to the specified disengagement torque, which is marked on the coupling. The adjustment range (min./max.) is indicated on the **adjustment nut (1)**. The customer can adjust the disengagement torque infinitely within the **adjustment range (12)** by varying the pretension of the disc springs. The adjustment range must not be exceeded during the adjustment process. After loosening the **lock screw (11)**, the disengagement torque can be adjusted using a suitable tool, e.g. a torque adjusting wrench to DIN 1816. The three locking screws (11) should then be tightened again.



Important!

WITTENSTEIN alpha torque limiters incorporate disc springs with special spring characteristics. Never exceed the max./min. range of the disengagement torque, which is located along the downward slope of this characteristic curve.

Important information

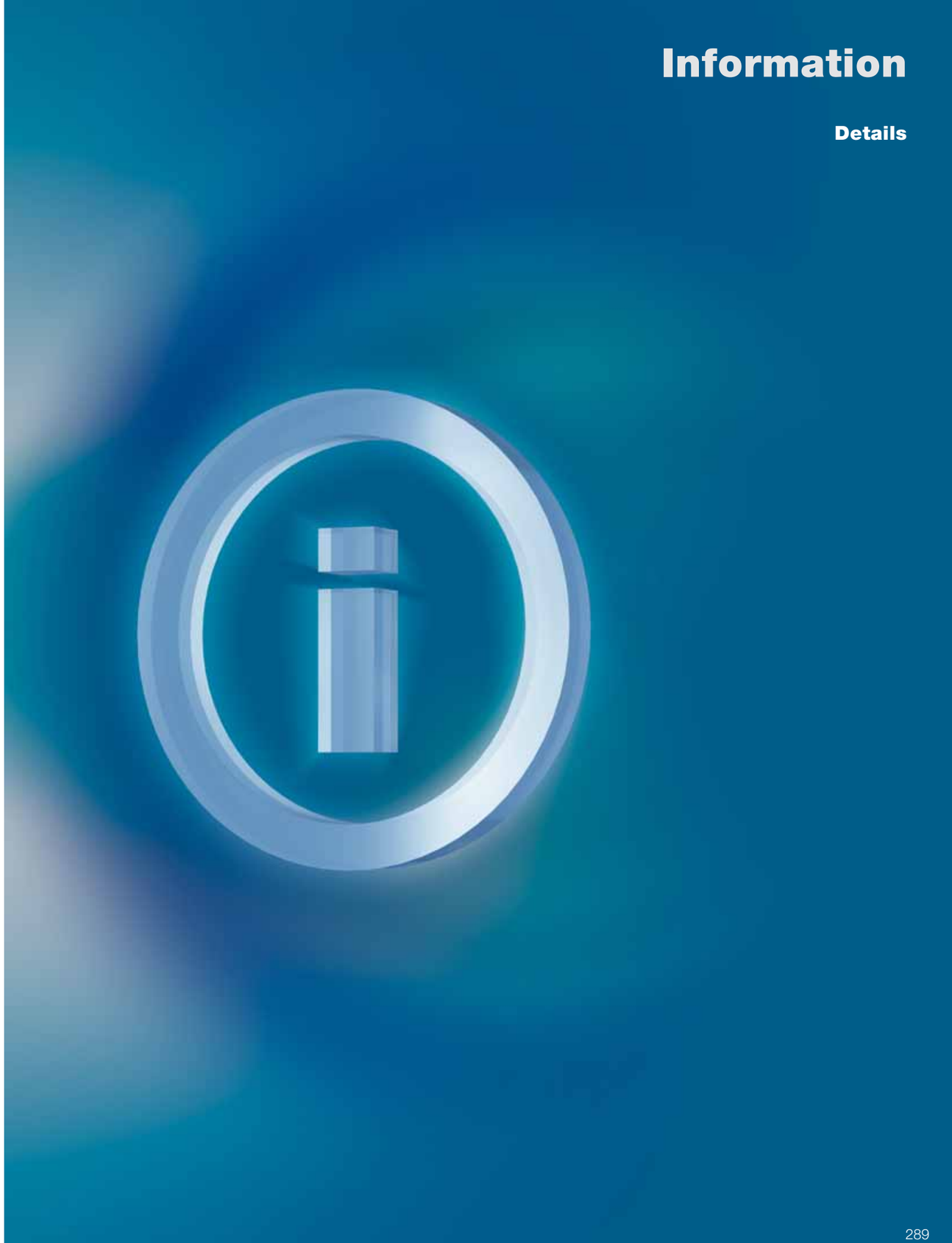
$$T_{ms} \geq 0 \cdot J_s + T_{ms} \geq \left[\frac{J_s}{J_s + J_L} \cdot (T_{ms} - T_{ma}) + T_{ma}\right] \cdot S_a \text{ [Nm]}$$

$$T_{2m} = \sqrt{\frac{|n_{2b}| \cdot t_b \cdot |T_{2b}|^3 + \ldots + |n_{2n}| \cdot t_n \cdot |T_{2n}|^3}{|n_{2b}| \cdot t_b + \ldots + |n_{2n}| \cdot t_n}}$$

Read the following pages for information on quick selection, configuration, design and handling of your WITTENSTEIN alpha gearhead.

Information

Details



Quick **gearhead selection**

The quick gearhead selection feature is designed exclusively for calculating gearhead sizes approximately. Quick selection is not a substitute for the detailed design feature! To select a specific gearhead, proceed as described in the Chapter „Gearhead – Detailed design“ or „V-DRIVE® – Detailed design“. For quick, convenient and reliable gearhead selection, we recommend using WITTENSTEIN alpha's cymex® design software.

Cyclic operation S5 Valid for ≤ 1000 cycles/hour Duty cycle < 60 % and < 20 min.[a)]	1. Calculate the max. motor acceleration torque using motor data **T_{MaxMot} [Nm] or [in.lb]** 2. Calculate the max. available acceleration torque at the gearhead output T_{2b} [Nm] or [in.lb] **$T_{2b} = T_{MaxMot} \cdot i$** 3. Compare the max. available acceleration torque T_{2b} [Nm] or [in.lb] with the max. permissible acceleration torque T_{2B} [Nm] or [in.lb] at the gearhead output **$T_{2b} \leq T_{2B}$**	4. Compare the bore hole diameter on the clamping hub (see technical data sheets) 5. Compare the motor shaft length L_{Mot} [mm] or [in] with the min. and max. dimensions in the corresponding dimension sheet
Continuous operation S1 Duty cycle ≥ 60 % or ≥ 20 min.[a)]	1. Select cyclic operation S5 2. Calculate the rated motor torque **T_{1NMot} [Nm] or [in.lb]** 3. Calculate the previous rated torque at the gearhead output T_{2n} [Nm] or [in.lb] **$T_{2n} = T_{1NMot} \cdot i$**	4. Compare the previous rated torque T_{2n} [Nm] or [in.lb] with the permissible nominal torque T_{2N} [Nm] or [in.lb] at the gearhead output **$T_{2n} \leq T_{2N}$** 5. Calculate the previous input speed **n_{1n} [rpm]** 6. Compare the previous input speed n_{1n} [rpm] with the permissible rated speed n_{1N} [rpm] **$n_{1n} \leq n_{1N}$**

[a)] recommended by WITTENSTEIN alpha. Please contact us if you require further assistance.

Cyclic operation **S5** and continuous operation **S1**

$$ED = \frac{(t_b + t_c + t_d)}{(t_b + t_c + t_d + t_e)} \cdot 100\,[\%]$$

$ED = t_b + t_c + t_d$ [min] [a)]

$$Z_h\ ^{a)} = \frac{3600\ [s/h]}{(t_b + t_c + t_d + t_e)}$$

[a)] see diagram 1 "Load factor"

f_s is dependent on Z_h (diagram 1)

T_{2b} = depends on the application

$T_{2b,\,fs} = T_{2b} \cdot f_s$

n_{2max} depends on the application

i depends on
n – required output speed (for the application)
– reasonable input speed (gearhead/motor)

$n_{1max} = n_{2max} \cdot i$

$n_{1max} \leq n_{1Mot\ max}$

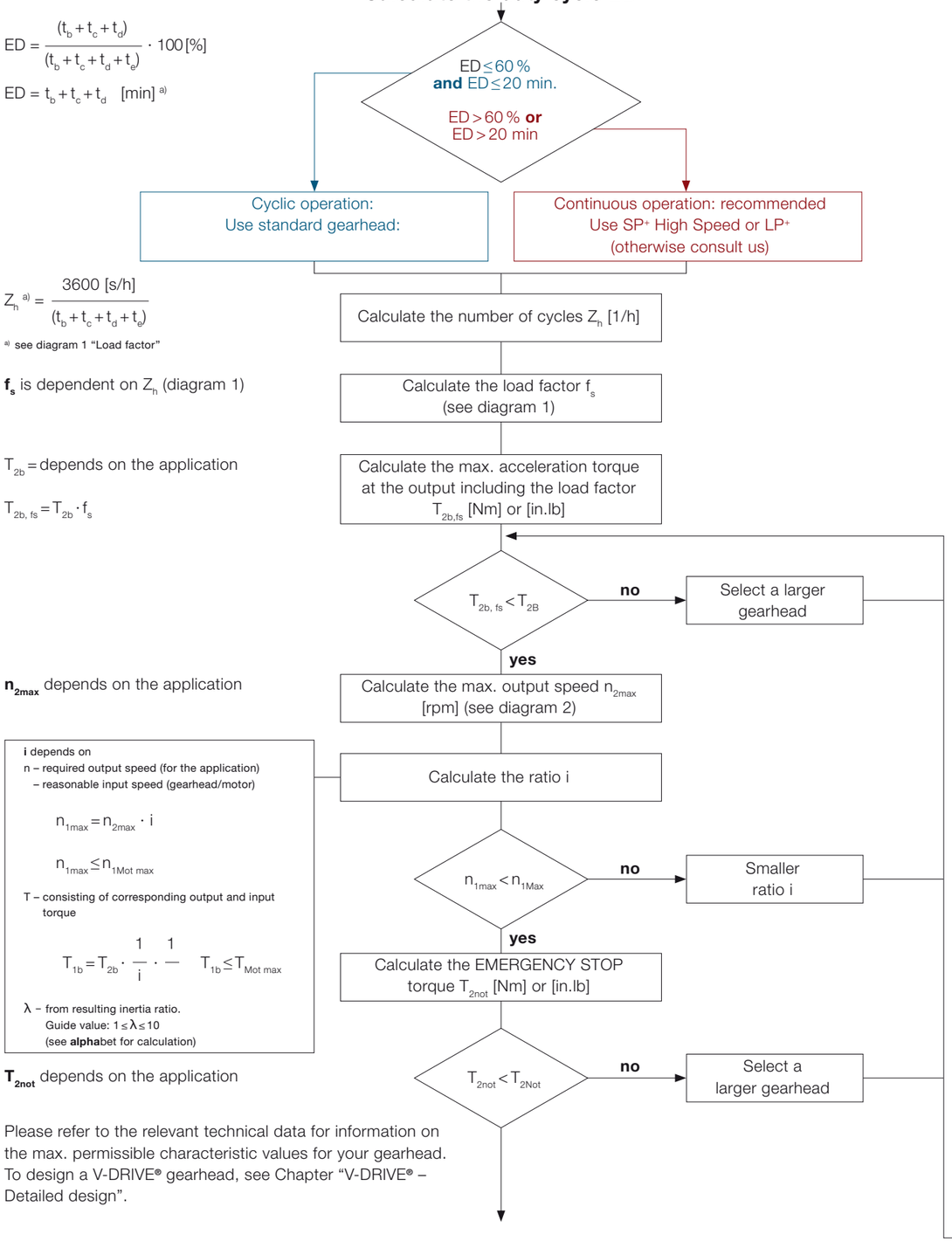
T – consisting of corresponding output and input torque

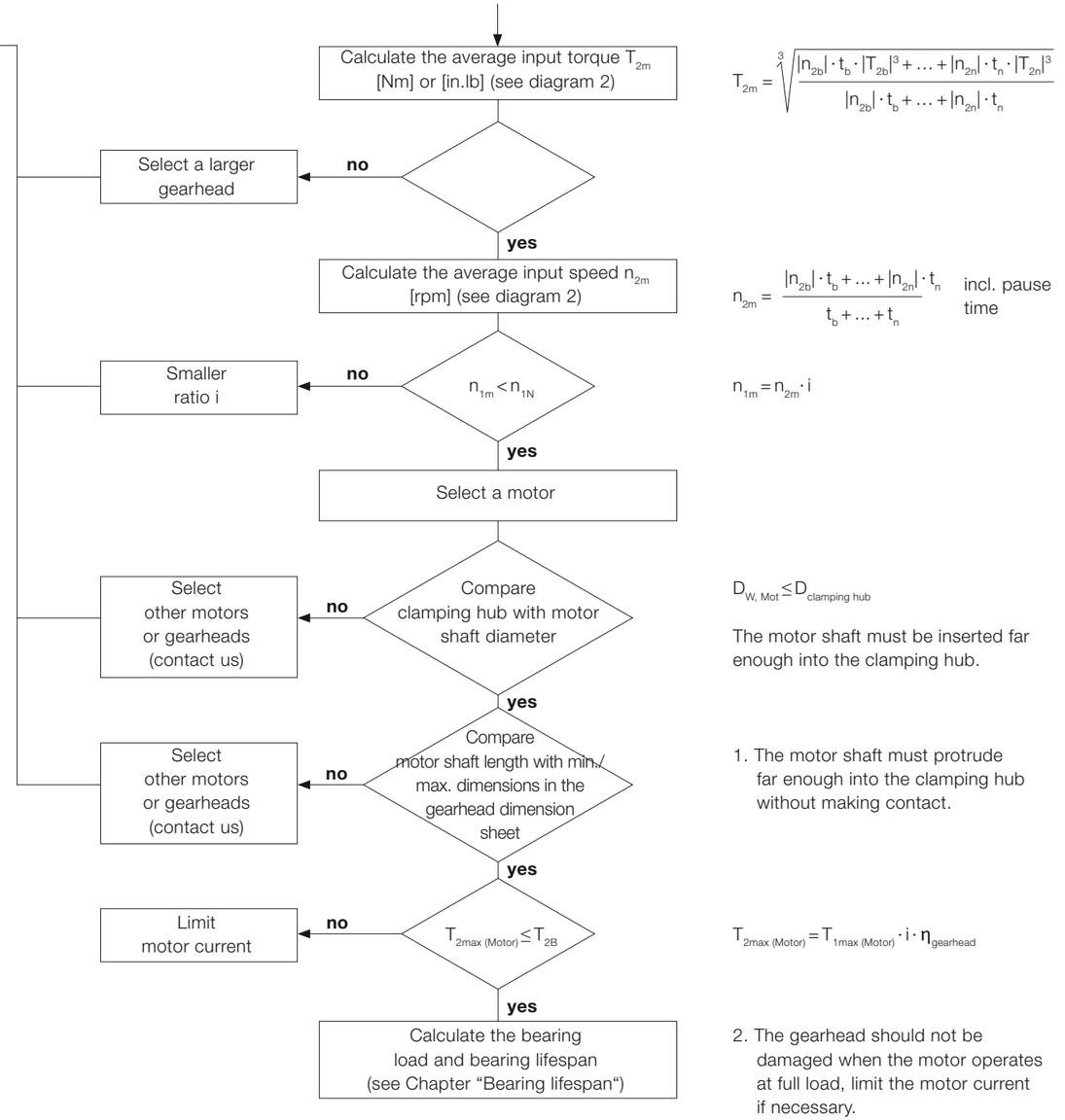
$$T_{1b} = T_{2b} \cdot \frac{1}{i} \cdot \frac{1}{\eta} \qquad T_{1b} \leq T_{Mot\ max}$$

λ – from resulting inertia ratio.
Guide value: $1 \leq \lambda \leq 10$
(see **alpha**bet for calculation)

T_{2not} depends on the application

Please refer to the relevant technical data for information on the max. permissible characteristic values for your gearhead. To design a V-DRIVE® gearhead, see Chapter "V-DRIVE® – Detailed design".





$$T_{2m} = \sqrt[3]{\frac{|n_{2b}| \cdot t_b \cdot |T_{2b}|^3 + \ldots + |n_{2n}| \cdot t_n \cdot |T_{2n}|^3}{|n_{2b}| \cdot t_b + \ldots + |n_{2n}| \cdot t_n}}$$

$$n_{2m} = \frac{|n_{2b}| \cdot t_b + \ldots + |n_{2n}| \cdot t_n}{t_b + \ldots + t_n}$$ incl. pause time

$n_{1m} = n_{2m} \cdot i$

$D_{W,\,Mot} \leq D_{clamping\ hub}$

The motor shaft must be inserted far enough into the clamping hub.

1. The motor shaft must protrude far enough into the clamping hub without making contact.

$T_{2max\ (Motor)} = T_{1max\ (Motor)} \cdot i \cdot \eta_{gearhead}$

2. The gearhead should not be damaged when the motor operates at full load, limit the motor current if necessary.

Diagram 1
Large number of cycles combined with short acceleration times may cause the drive train to vibrate. Use the load factor f_s to include the resulting excess torque values in calculations.

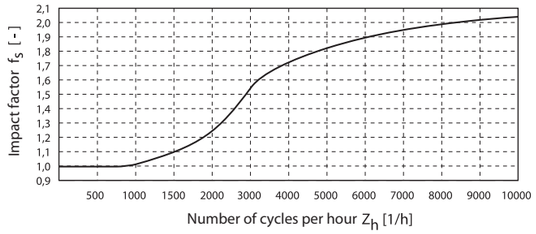
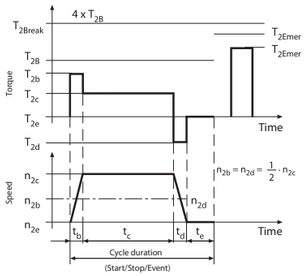
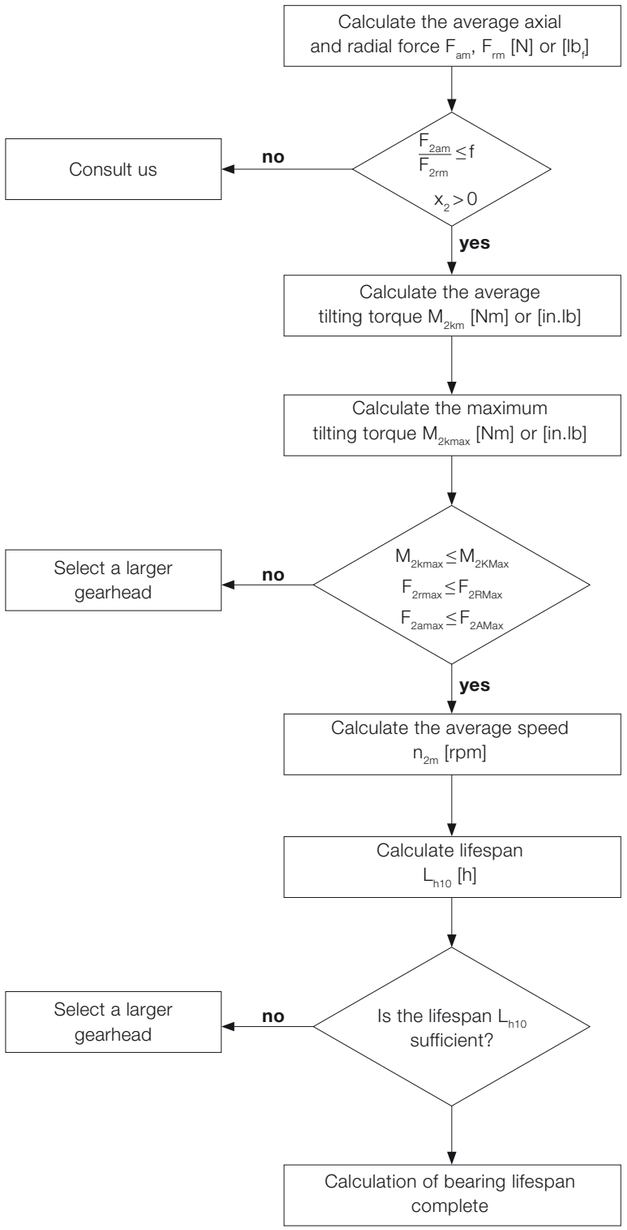


Diagram 2
Standard collective load at output
If the load on the gearhead in continuous operation S1 is less than or equal to the rated torque T_{2N}, the gearing is. At input speeds less than/equal to the rated speed n_{1N}, the temperature of the gearhead will not exceed 90 °C under average ambient conditions.



Bearing lifespan L_{h10} (output bearing)



$$F_{2am} = \sqrt[3]{\frac{|n_{2b}| \cdot t_b \cdot |F_{2ab}|^3 + \ldots + |n_{2n}| \cdot t_n| \cdot F_{2an}|^3}{|n_{2b}| \cdot t_b + \ldots + |n_{2n}| \cdot t_n}}$$

$$F_{2rm} = \sqrt[3]{\frac{|n_{2b}| \cdot t_b \cdot |F_{2rb}|^3 + \ldots + |n_{2n}| \cdot t_n| \cdot F_{2rn}|^3}{|n_{2b}| \cdot t_b + \ldots + |n_{2n}| \cdot t_n}}$$

$$M_{2km} = \frac{F_{2am} \cdot y_2 + F_{2rm} \cdot (x_2 + z_2)}{W}$$ [a]

$$M_{2kmax} = \frac{F_{2amax} \cdot y_2 + F_{2rmax} \cdot (x_2 + z_2)}{W}$$ [a]

[a] x_2, y_2, z_2 in mm or in

$$n_{2m} = \frac{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}{t_b + \ldots + t_n}$$

$$L_{h10} = \frac{16666}{n_{2m}} \cdot \left[\frac{K1_2}{M_{2km}} \right]^{p_2}$$

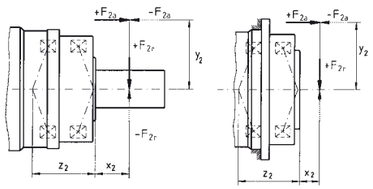
	metric	inch
W	1000	1

	TP⁺/TPK⁺	SP⁺/SPK⁺	LP⁺/LPB⁺ LPK⁺	alphira® (CP)
f	0.37	0.40	0.24	0.24

LP⁺/LPB⁺/LPK⁺		050	070	090	120	155
z_2	[mm]	20	28.5	31	40	47
	[in]	0.79	1.12	1.22	1.58	1.85
$K1_2$	[Nm]	75	252	314	876	1728
	[in.lb]	664	2230	2779	7753	15293
p_2		3	3	3	3	3

alphira® (CP)		040	060	080	115
z_2	[mm]	12.5	19.5	23.5	28.5
	[in]	0.49	0.77	0.93	1.12
$K1_2$	[Nm]	15.7	70.0	157.0	255.0
	[in.lb]	139	620	1389	2257
p_2		3	3	3	3

Example with output shaft and flange:

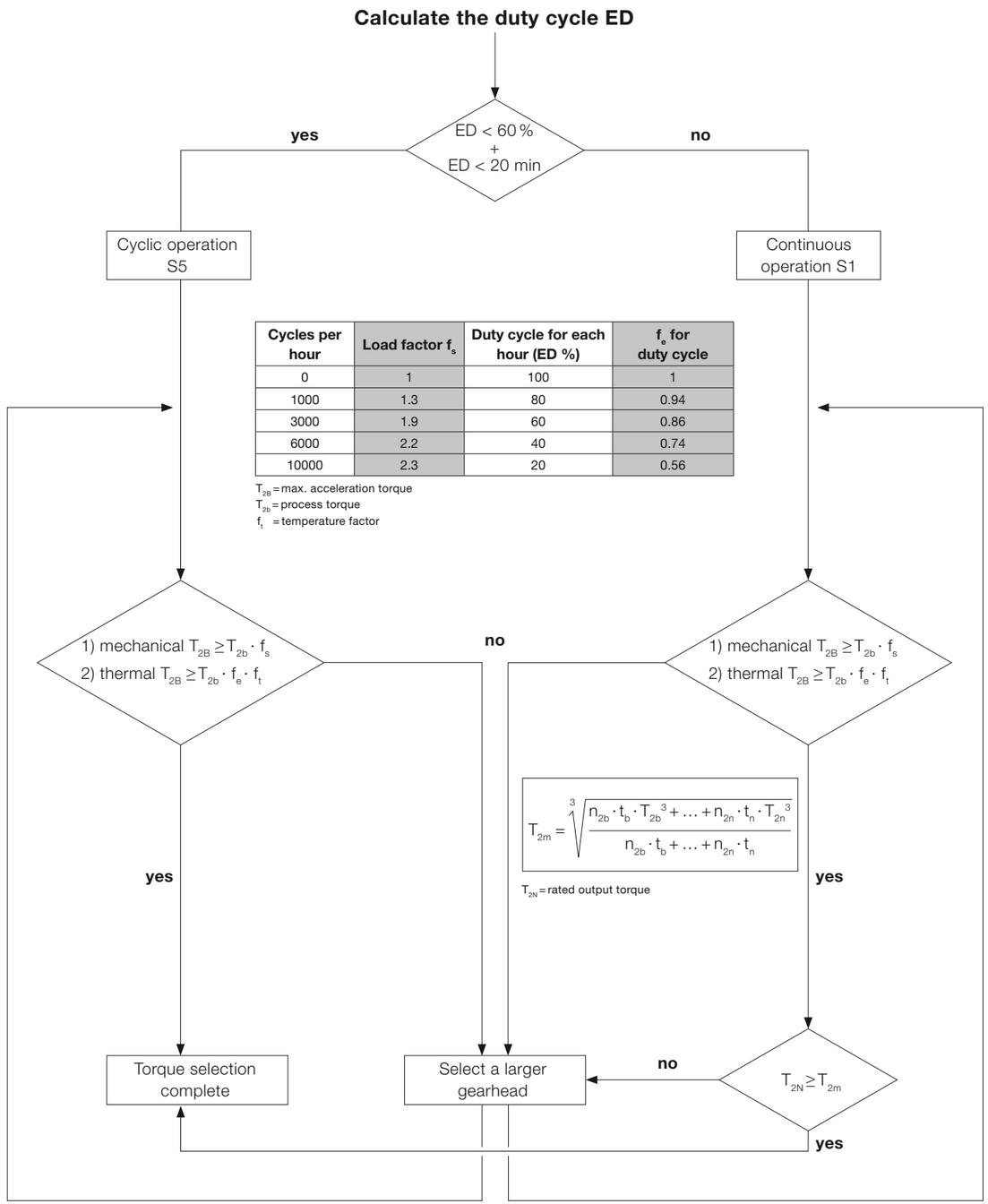


SP⁺/SPK⁺		060	075	100	140	180	210	240
z_2	[mm]	42.2	44.8	50.5	63.0	79.2	94.0	99.0
	[in]	1.66	1.76	1.99	2.48	3.12	3.70	3.90
$K1_2$	[Nm]	795	1109	1894	3854	9456	15554	19521
	[in.lb]	7036	9815	16762	34108	83686	137653	172761
p_2		3.33	3.33	3.33	3.33	3.33	3.33	3.33

TP⁺/TPK⁺		004	010	025	050	110	300	500
z_2	[mm]	57.6	82.7	94.5	81.2	106.8	140.6	157
	[in]	2.27	3.26	3.72	3.20	4.21	5.48	6.12
$K1_2$	[Nm]	536	1325	1896	4048	9839	18895	27251
	[in.lb]	4744	11726	16780	35825	87075	167220	241171
p_2		3.33	3.33	3.33	3.33	3.33	3.33	3.33

TK⁺/SK⁺/HG⁺/LK⁺: Calculation using cymex®.
Please contact us for further information.

Cyclic operation **S5** and continuous operation **S1**



Cycles per hour	Load factor f_s	Duty cycle for each hour (ED %)	f_e for duty cycle
0	1	100	1
1000	1.3	80	0.94
3000	1.9	60	0.86
6000	2.2	40	0.74
10000	2.3	20	0.56

T_{2B} = max. acceleration torque
T_{2b} = process torque
f_t = temperature factor

T_{2N} = rated output torque

Speed/Torque

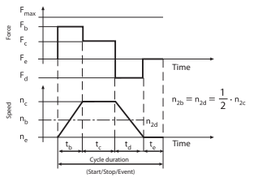
			VDT/VDH/VDS 050 n_{1Max} = 6000 rpm						VDT/VDH/VDS 063 n_{1Max} = 4500 rpm					
Ratio	***i***		**4**	**7**	**10**	**16**	**28**	**40**	**4**	**7**	**10**	**16**	**28**	**40**
	T_{2Not}	Nm	230	242	242	250	262	236	460	484	491	494	518	447
		in.lb	2036	2142	2142	2213	2319	2089	4071	4283	4345	4372	4584	3956
n_1 = 500 rpm	T_{2N}	Nm	39	52	54	59	65	54	120	155	164	174	200	175
		in.lb	345	460	478	522	5759	478	1062	1372	1451	1540	1770	1549
	T_{2B}	Nm	54	71	74	81	90	74	164	213	225	238	274	240
		in.lb	478	628	655	717	797	655	1451	1885	1991	2106	2425	2124
	η	%	92	89	86	82	72	64	93	91	88	83	74	68
	f_t [a]		0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
n_1 = 1000 rpm	T_{2N}	Nm	43	56	59	64	71	59	128	166	175	185	214	189
		in.lb	381	496	522	566	628	522	1133	1469	1549	1637	1894	1673
	T_{2B}	Nm	58	76	80	88	97	81	176	227	240	254	293	259
		in.lb	513	673	708	779	858	717	1558	2009	2124	2248	2593	2292
	η	%	94	91	89	85	77	69	94	93	91	86	78	73
	f_t [a]		0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.56	0.65	0.57
n_1 = 2000 rpm	T_{2N}	Nm	44	57	60	65	72	60	124	163	176	186	199	190
		in.lb	389	504	531	575	637	531	1097	1443	1558	1646	1761	1682
	T_{2B}	Nm	60	78	82	89	99	83	179	224	241	255	272	260
		in.lb	531	690	726	788	876	735	1584	1982	2133	2257	2407	2301
	η %	%	95	93	91	88	75	75	96	94	93	89	83	78
	f_t [a]		0.53	0.53	0.53	0.56	0.61	0.53	0.76	0.95	0.94	0.99	1.06	1.01
n_1 = 3000 rpm	T_{2N}	Nm	43	56	59	64	71	59	87	124	141	152	165	159
		in.lb	381	496	522	566	628	522	770	1097	1248	1345	1460	1407
	T_{2B}	Nm	59	77	81	88	97	81	138	176	194	209	224	217
		in.lb	522	681	717	779	858	717	1221	1558	1717	1850	1982	1920
	η	%	96	94	93	90	83	78	96	95	94	91	85	81
	f_t [a]		0.57	0.75	0.78	0.86	0.95	0.79	1.00	1.11	1.23	1.32	1.42	1.38
n_1 = 4000 rpm	T_{2N}	Nm	37	52	58	63	70	58	64	96	116	128	139	136
		in.lb	327	460	513	558	620	513	566	850	1027	1133	1230	1204
	T_{2B}	Nm	58	76	79	87	96	80	109	143	160	175	190	187
		in.lb	513	673	699	770	850	708	965	1266	1416	1549	1682	1655
	η	%	96	95	93	91	85	80	97	96	94	92	86	83
	f_t [a]		0.89	1.16	1.22	1.16	1.28	1.23	1.44	1.56	1.74	1.90	2.07	2.03

[a] f_t: Cyclic and continuous operation (see left page)

			VDT/VDH/VDS 080 n_{1Max} = 4000 rpm						VDT/VDH/VDS 100 n_{1Max} = 3500 rpm					
Ratio	***i***		**4**	**7**	**10**	**16**	**28**	**40**	**4**	**7**	**10**	**16**	**28**	**40**
	T_{2Not}	Nm	938	993	963	1005	1064	941	1819	1932	1940	1955	2073	1856
		in.lb	8301	8788	8523	8894	9416	8328	16098	17098	17169	17302	18346	16426
n_1 = 500 rpm	T_{2N}	Nm	342	438	448	494	558	461	843	952	980	992	1072	980
		in.lb	3027	3876	3965	4372	4938	4080	7461	8425	8673	8779	9487	8673
	T_{2B}	Nm	469	601	613	677	764	631	1155	1304	1343	1359	1469	1343
		in.lb	4151	5319	5425	5991	6761	5584	10222	11540	11886	12027	13001	11886
	η	%	94	92	89	86	77	70	95	93	91	87	80	76
	f_t [a]		0.53	0.53	0.54	0.57	0.64	0.53	0.62	0.70	0.72	0.73	0.79	0.69
n_1 = 1000 rpm	T_{2N}	Nm	358	419	410	456	486	427	644	762	799	813	892	828
		in.lb	3168	3708	3629	4036	4301	3779	5699	6744	7071	7195	7894	7328
	T_{2B}	Nm	491	574	561	625	665	584	883	1044	1095	1113	1221	1134
		in.lb	4345	5080	4965	5531	5885	5168	7815	9239	9691	9850	10806	10036
	η	%	95	93	91	88	81	74	95	94	92	88	82	79
	f_t [a]		0.70	0.82	0.80	0.83	0.88	0.78	0.79	0.93	0.98	0.99	1.09	0.94
n_1 = 2000 rpm	T_{2N}	Nm	226	303	300	348	373	327	390	533	575	591	663	629
		in.lb	2000	2682	2655	3080	3301	2894	3452	4717	5089	5230	5868	5567
	T_{2B}	Nm	335	415	411	476	511	448	581	730	788	810	908	862
		in.lb	2965	3673	3637	4213	4522	3965	5142	6461	6974	7169	8036	7629
	η	%	96	95	93	89	84	79	96	95	94	91	86	82
	f_t [a]	%	0.90	1.12	1.10	1.28	1.37	1.20	1.18	1.30	1.40	1.44	1.62	1.53
n_1 = 3000 rpm	T_{2N}	Nm	155	224	233	278	301	264	261	384	443	459	524	505
		in.lb	1372	1982	2062	2460	2664	2336	2310	3398	3921	4062	4637	4469
	T_{2B}	Nm	247	320	319	381	413	362	420	551	606	629	718	692
		in.lb	2186	2832	2832	3372	3655	3204	3717	4876	5363	5567	6354	6124
	η	%	97	96	94	92	86	81	97	96	95	92	87	84
	f_t [a]		1.22	1.58	1.57	1.88	2.03	1.78	1.83	1.96	2.16	2.24	2.56	2.46
n_1 = 3500 rpm	T_{2N}	Nm	131	195	209	252	274	241	–	–	–	–	–	–
		in.lb	1159	1726	1850	2230	2425	2133						
	T_{2B}	Nm	217	285	286	345	376	330	–	–	–	–	–	–
		in.lb	1920	2522	2531	3053	3328	2921						
	η	%	97	96	94	92	87	82	–	–	–	–	–	–
	f_t [a]		1.66	1.78	1.79	2.16	2.35	2.06	–	–	–	–	–	–

[a] f_t: Cyclic and continuous operation (see left page) Ratios i = 28 and i = 40 are self-locking at zero speed. The self-locking state may be overcome and therefore the gearhead should not replace a brake. For applications that run at a continuous speed of 3000 rpm or more in installation position F or G, please contact us.

Bearing lifespan L_{h10} (output bearing)



Output (VDT, VDH & VDS version)

Calculate the average axial and radial force F_{2am}, F_{2rm} [N]

Index "2" ≙ output

$\frac{F_{2am}}{F_{2rm}} \leq 0.4$; $x_2 > 0$

no / **yes**

$$F_{2am} = \sqrt[3]{\frac{n_{2b} \cdot t_b \cdot F_{2ab}{}^3 + \ldots + n_{2n} \cdot t_n \cdot F_{2an}{}^3}{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}}$$

$$F_{2rm} = \sqrt[3]{\frac{n_{2b} \cdot t_b \cdot F_{2rb}{}^3 + \ldots + n_{2n} \cdot t_n \cdot F_{2rn}{}^3}{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}}$$

Consult us!

$$M_{2km} = \frac{F_{2am} \cdot y_2 + F_{2rm} \cdot (x_2 + z_2)}{W}$$

Calculate the average tilting torque $M_{2k\,m}$ [Nm] or [in.lb]

Z_2 [mm]	VDT	VDH	VDS
VD050	104	71.5	92.25
VD063	113.5	82	111.5
VD080	146.75	106.25	143.25
VD100	196	145.5	181

	metric
W	1000

$$M_{2\,k\,max} = \frac{F_{2\,a\,max} \cdot y_2 + F_{2\,r\,max} \cdot (x_2 + z_2)}{W}$$

Calculate the maximum tilting torque $M_{2k\,max}$ [Nm] or [in.lb]

Version	VD 050	VD 063	VD 080	VD 100
$M_{2K\,Max}$ [Nm]	409	843	1544	3059
$F_{2R\,Max}$ [N]	3800	6000	9000	14000
$F_{2A\,Max}$ [N]	5000	8250	13900	19500

$M_{2\,k\,max} \leq M_{2\,K\,Max}$; $F_{2\,r\,max} \leq F_{2\,R\,Max}$; $F_{2\,a\,max} \leq F_{2\,A\,Max}$

no / **yes**

Select a larger gearhead

$K1_2$ [Nm]	VDT	VDH	VDS
VD 050	3050	2320	2580
VD 063	4600	3620	5600
VD 080	9190	9770	10990
VD 100	20800	15290	20400

$$n_{2\,m} = \frac{n_{2\,b} \cdot t_b + \ldots + n_{2\,n} \cdot t_n}{t_b + \ldots + t_n}$$

Calculate the average speed $n_{2\,m}$ [rpm]

P_t	T/H/S
i = 4	1.5
i = 7	0.72
i = 10	0.6
i = 16	0.5
i = 28	0.4
i = 40	0.36

$$L_{2\,h} = \frac{16666}{n_{2m}} \cdot \left[\frac{K1_2}{p_t \cdot T_{2m} + M_{2km}} \right]^{3.33}$$

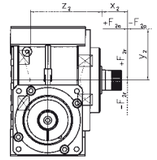
Calculate the lifespan $L_{2\,h}$ [h]

lifespan $L_{2\,h}$ sufficient?

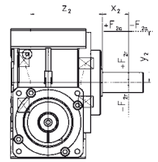
no / **yes**

Torque selection complete

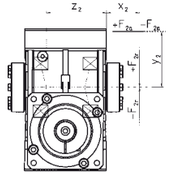
VDS involute



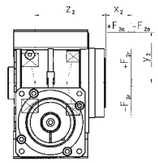
VDS smooth, keywayed



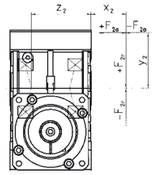
VDH smooth



VDT



VDH keywayed



Rating for **torque limiters**

According to disengagement torque

As a rule, torque limiters are rated according to the required disengagement torque, which must be greater than the torque required for normal machine operation. The disengagement torque of the torque limiters is usually calculated in accordance with the drive specifications. The following calculation has proved to be a good rule of thumb:

$$T_{KN} \geq 1.5 \cdot T_{2b} \text{ [Nm]}$$

T_{KN} = rated coupling torque [Nm]
T_{2b} = max. available acceleration torque [Nm]

or

$$T_{KN} \geq 9550 \cdot \frac{P_{AN}}{n} \cdot 1.5 \text{ [Nm]}$$

T_{KN} = rated coupling torque [Nm]
P_{AN} = drive power [kw]
n = drive speed [rpm]

According to acceleration torque (start-up at no load)

S_A = Impact or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (impact load)

$$T_{KN} \geq \alpha \cdot J_L \geq \frac{J_L}{J_A + J_L} \cdot T_{2b} \cdot S_A \text{ [Nm]}$$

T_{KN} = rated coupling torque [Nm]
α = angular acceleration [1/s²]

$$\alpha = \frac{\omega}{t} = \frac{\pi \cdot n}{t \cdot 30} \quad \frac{1}{s^2}$$

t = acceleration time [sec.]
ω = angular speed [1/s]
n = drive speed [rpm]
J_L = moment of inertia on load side [kgm²]
J_A = moment of inertia on drive side [kgm²]
T_{2b} = max. available acceleration torque [Nm]

Values of S_A = 2 – 3 are usual for servo drives on machine tools.

According to acceleration and load torque

$$T_{KN} \geq \alpha \cdot J_L + T_{AN} \geq \left[\frac{J_L}{J_A + J_L} \cdot (T_{2b} - T_{AN}) + T_{AN}\right] \cdot S_A \text{ [Nm]}$$

T_{KN} = rated coupling torque [Nm]
α = angular acceleration [1/s²]
t = acceleration time [sec.]
ω = angular speed [1/s]
n = drive speed [rpm]
J_L = moment of inertia on load side [kgm²]
T_{AN} = load torque [Nm]
J_A = moment of inertia on drive sidee [kgm²]
T_{2b} = max. available acceleration torque [Nm]

S_A = Impact or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (impact load)

Values of S_A = 2 3 are usual for servo drives on machine tools.

According to feed force

Spindle drive

$$T_{AN} = \frac{s \cdot F_V}{2000 \cdot \pi \cdot \eta} \quad \text{[Nm]}$$

T_{AN} = load torque [Nm]
S = ball screw pitch [mm]
F_V = feed force [N]
η = spindle efficiency

Timing belt drive

$$T_{AN} = \frac{d_0 \cdot F_V}{2000} \quad \text{[Nm]}$$

T_{AN} = load torque [Nm]
d_0 = pinion diameter (timing belt pulley) [mm]
F_V = feed force [N]

According to resonant frequency (TL 2 / 3 with bellows attachment)

The resonant frequency of the coupling must be higher or lower than the machine frequency. For the purpose of calculation, the drive is reduced to a two-mass system:

$$f_e = \frac{1}{2 \cdot \pi} \sqrt{C_T \cdot \frac{J_{Mach} + J_A}{J_{Mach} \cdot J_A}} \quad \text{[Hz]}$$

C_T = torsional rigidity of coupling [Nm/rad]
J_{Mach} = moment of inertia of machine [kgm²]
J_A = moment of inertia on drive side [kgm²]
f_e = resonant frequency of two-mass system [Hz]

According to torsional rigidity (TL 2 / 3 with bellows attachment)

Transmission errors due to a torsional load on the metal bellows:

$$\varphi = \frac{180}{\pi} \cdot \frac{T_{2b}}{C_T} \text{ [degrees]}$$

φ = angle of turn [degrees]
C_T = torsional rigidity of coupling [Nm/rad]
T_{2b} = max. available acceleration torque [Nm]

According to the function system

Load holding version: On TL 1 and TL models, the load holding version has a double load safety margin. Ensure that models with a bellows attachment (TL 2 / 3) are of adequate size. The blocking load in this case should not exceed the rated torque of the coupling.

Rating for **bellows couplings**

According to torque

In most cases, the couplings should be rated according to the maximum peak torque to be transmitted regularly. The peak torque must not exceed the rated torque of the coupling, i.e. the torque that can be transmitted continuously within the permissible speed and misalignment ranges. The following formula has proved to be a good rule of thumb:

$$T_{KN} \geq 1.5 \cdot T_{2b} \quad \text{[Nm]}$$

T_{KN} = rated coupling torque [Nm]
T_{2b} = max. available acceleration torque [Nm]

According to acceleration torques

For precise rating, the acceleration torque and the moment of inertia of the entire machine should be taken into consideration. Especially with servo motors, ensure that the acceleration or deceleration torque is several times greater than the rated torque.

S_A = Impact or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 – 4 (impact load)

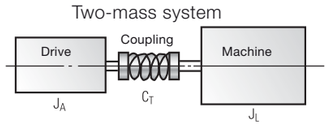
Values of S_A = 2 3 are usual for servo drives on machine tools.

$$T_{KN} \geq T_{2b} \cdot S_A \cdot \frac{J_L}{J_A + J_L} \quad \text{[Nm]}$$

T_{KN} = rated torque of coupling [Nm]
T_{2b} = max. available acceleration torque [Nm]
J_L = moment of inertia of machine [kgm²]
J_A = moment of inertia on drive side [kgm²]

According to resonant frequency

The resonant frequency of the coupling must be higher or lower than the machine frequency. For the purpose of calculation, the drive is reduced to a two-mass system:



$$f_e = \frac{1}{2 \cdot p} \sqrt{C_T \cdot \frac{J_A + J_L}{J_A \cdot J_L}} \quad \text{[Hz]}$$

C_T = torsional rigidity of coupling [Nm/rad]
f_e = natural frequency of 2-mass system [HZ]
f_{er} = excitation frequency of drive [HZ]

According to torsional rigidity

Transmission errors due to a torsional load on the metal bellows:

$$\varphi = \frac{180}{\pi} \cdot \frac{T_{2b}}{C_T} \text{ [degrees]}$$

φ = angle of turn [degrees]
C_T = torsional rigidity of coupling [Nm/rad]
T_{2b} = max. available acceleration torque [Nm]

The **alpha**bet

Acceleration torque (T_{2B})

The acceleration torque T_{2B} is the maximum permissible torque that can briefly be transmitted at the output by the gearhead after ≤1000/h cycles. For >1000/h cycles, the → **impact factor** must be taken into account. T_{2B} is the limiting parameter in cyclic operation.

Adapter plate

WITTENSTEIN alpha uses a system of standardized adapter plates to connect the motor and the gearhead, making it possible to mount an WITTENSTEIN alpha gearhead to any desired motor without difficulty.

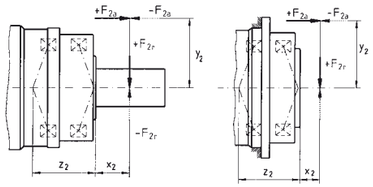
Angular minute

A degree is subdivided into 60 angular minutes (=60 arcmin=60'). In other words, if the torsional backlash is specified as 1 arcmin, for example, the output can be turned 1/60°. The repercussions for the actual application are determined by the arc length: $b = 2 \cdot \pi \cdot r \cdot \alpha° / 360°$. A pinion with a radius r=500 mm on a gearhead with standard torsional backlash $j_t = 3'$ can be turned b=0.4 mm.

Axial force (F_{2AMax})

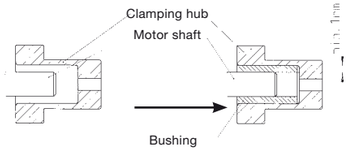
In the case of SP⁺/LP⁺/SPK⁺, the axial force F_{2AMax} acting on a gearhead runs parallel to its output shaft. On a TP⁺, the force runs perpendicular to its output shaft. It may be applied with axial offset via a lever arm y_2 under certain circumstances, in which case it also generates a bending moment.
If the axial force exceeds the permissible catalogue values, additional design features (e.g. axial bearings) must be implemented to absorb these forces.

Example with output shaft and flange:



Bushing

If the motor shaft diameter is smaller than the → **clamping hub**, a bushing is used to compensate the difference in diameter.



Clamping hub

The clamping hub ensures a frictional connection between the motor shaft and gearhead. A → **bushing** is used as the connecting element if the motor shaft diameter is smaller than that of the clamping hub.

Continuous operation (S1)

Continuous operation is defined by the → **duty cycle**. If the duty cycle is greater than 60 % or longer than 20 minutes, this qualifies as continuous operation. → **Operating modes**

Cyclic operation (S5)

Cyclic operation is defined via the → **duty cycle**. If the duty cycle is less than 60 % and shorter than 20 minutes, it qualified as cyclic operation **(→ operating modes)**.

cymex®

cymex® is the calculation software developed by our company for dimensioning complete drive trains. We can also provide training to enable you to make full use of all the possibilities provided by the software.

Degree of protection (IP)

The various degrees of protection are defined in DIN EN 60529 "Degrees of protection offered by enclosure (IP code)". The IP degree of protection (IP stands for International Protection) is represented by two digits. The first digit indicates the protection against the ingress of impurities and the second the protection against the ingress of water.

Example: **IP65**

- 6 — Protection against impurities (Dust resistance)
- 5 — Protection against water

Duty cycle (ED)

The duty cycle ED is determined by one cycle. The times for acceleration (t_b), constant travel if applicable (t_c) and deceleration (t_d) combined yield the duty cycle in minutes. The duty cycle is expressed as a percentage with inclusion of the pause time t_e.

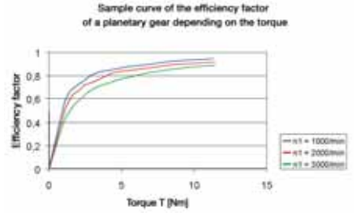
$$ED\,[\%] = \frac{t_b + t_c + t_d}{t_b + t_c + t_d + t_e} \quad \frac{\text{Motion duration}}{\text{Cycle duration}}$$

$$ED\,[\text{min}] = t_b + t_c + t_d$$

Efficiency (η)

Efficiency [%] η is the ratio of output power to input power. Power lost through friction reduces efficiency to less than 1 or 100 %.
$\eta = P_{out} / P_{in} = (P_{in} - P_{lost}) / P_{in}$

WITTENSTEIN alpha always measures the efficiency of a gearhead during operation at full load (T_{2B}). If the input power or torque are lower, the efficiency rating is also lower due to the constant no-load torque. Power losses do not increase as a result. Speed also has an effect on efficiency, as shown in the example diagram above.



Emergency stop torque (T_{2Not})

The emergency stop torque [Nm] T_{2Not} is the maximum permissible torque at the gearhead output and must not be reached more than 1000 times during the life of the gearhead. It must never be exceeded!

→ Refer to this term for further details.

High Speed (MC)

The High Speed version of our SP⁺ gearhead has been specially developed for applications in continuous operation at high input speeds, e.g. as found in the printing and packaging industries.

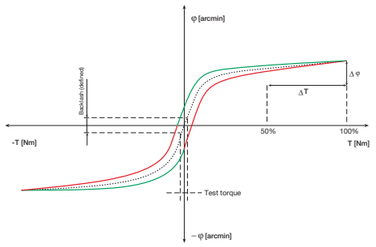
High Torque (MA)

The High Torque version of our TP⁺ gearhead has been specially developed for applications requiring extremely high torques and maximum rigidity.

MA = High Torque
MC = High Speed
MF = standard versions of our WITTENSTEIN alpha servo gearheads

Hysteresis curve

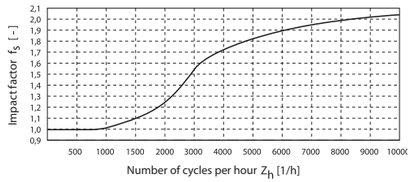
The hysteresis is measured to determine the torsional rigidity of a gearhead. The result of this measurement is known as the hysteresis curve.



If the input shaft is locked, the gearhead is loaded with a torque that increases continuously up to T_{2B} and is then relieved at the output in both directions. The torsional angle is plotted against the torque. This yields a closed curve from which the → **torsional backlash** and → **torsional rigidity** can be calculated.

Impact factor (f_s)

The maximum permissible acceleration torque during cyclic operation specified in the catalog applies for a cycle rate less than 1000/h. Higher cycle rates combined with short acceleration times can cause vibrations in the drive train. Use the load factor f_s to include the resulting excess torque values in calculations. The impact factor f_s can be determined with reference to the curve. This calculated value is multiplied by the actual acceleration torque T_{2b} and then compared with the maximum permissible acceleration torque T_{2B}. ($T_{2b} \cdot f_s = T_{2b,\,fs} < T_{2B}$)



Jerk

Jerk is derived from acceleration and is defined as the change in acceleration within a unit of time. The term impact is used if the acceleration curve changes abruptly and the jerk is infinitely large.

Lateral force (F_R)

Lateral force is the force component acting at right angles to the output shaft with the SP⁺/LP⁺/SPK⁺ or parallel to the output flange with the TP⁺. It acts perpendicular to the axial force and can assume an axial distance of x_2 in relation to the shaft nut with the SP⁺/LP⁺) or shaft flange with the TP⁺, which acts as a lever arm. The lateral force produces a bending moment (see also axial force).

Mass moment of inertia (J)

The mass moment of inertia J is a measurement of the effort applied by an object to maintain its momentary condition (at rest or moving).

Mesh frequency (f_z)

The mesh frequency may cause problems regarding vibrations in an application, especially if the excitation frequency corresponds to the intrinsic frequency of the application.
The mesh frequency can be calculated for all SP+, TP+ , LP+ and alphira® gearheads using the formula $f_z = 1{,}8 \cdot n_2$ [rpm] and is therefore independent of the ratio if the output speed is the same.
If it does indeed become problematic, the intrinsic frequency of the system can be changed or another gearhead (e.g. hypoid gearhead) with a different mesh frequency can be selected.

No load running torque (T_{012})

The no load running torque T_{012} is the torque which must be applied to a gearhead in order to overcome the internal friction; it is therefore considered lost torque. The values specified in the catalog are calculated by WITTENSTEIN alpha at a speed of $n_1 = 3000$ rpm and an ambient temperature of 20 °C.

T_{012}: 0 (no load) 1→2 (from input end to output end)

Nominal torque (T_{2N})

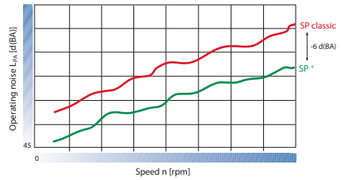
The nominal torque [Nm] T_{2N} is the torque continuously transmitted by a gearhead over a long period of time, i.e. in → **continuous operation** (without wear).

Operating modes (continuous operation **S1** and cyclic operation **S5**)

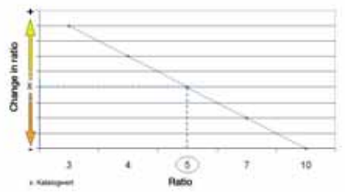
When selecting a gearhead, it is important to consider whether the motion profile is characterized by frequent acceleration and deceleration phases in cyclic operation (S5) as well as pauses, or whether it is designed for continuous operation (S1), i.e. with long phases of constant motion.

Operating noise (L_{PA})

Low noise level L_{PA} is a factor of growing importance for environmental and health reasons. WITTENSTEIN alpha has succeeded in reducing the noise of the new SP+ gearheads by another 6 dB(A) over the former SP units (i.e. sound reduced to one quarter). Noise levels are now currently 64 - 70 dB(A) depending on the size of the gearhead.
The gear ratio and speed both affect the noise level. The relationships are demonstrated in the following trend graphs.
As a general rule: A higher speed means a higher noise level, while a higher ratio means a lower noise level.
The values specified in our catalog relate to gearheads with the ratio i = 5 at a speed of n = 3000 rpm.



Change in operating noise in relation to the ratio



Positioning accuracy

The positioning accuracy is determined by the angular deviation from a setpoint and equals the sum of the torsional angles due to load → **(torsional rigidity and torsional backlash)** and kinetics → **(synchronization error)** occurring simultaneously in practise.

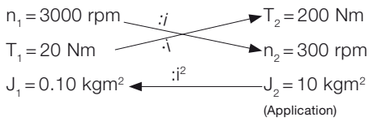
Rate of mass moment of inertia (λ = Lambda)

The ratio of mass moment of inertia λ is the ratio of external inertia (application side) to internal inertia (motor and gearhead side). It is an important parameter determining the controllability of an application. Accurate control of dynamic processes becomes more difficult with differing mass moments of inertia and as λ becomes greater. WITTENSTEIN alpha recommends that a guideline value of $\lambda < 5$ is maintained. A gearhead reduces the external mass moment of inertia by a factor of $1/i^2$.

$$\lambda = \frac{J_{external}}{J_{internal}}$$

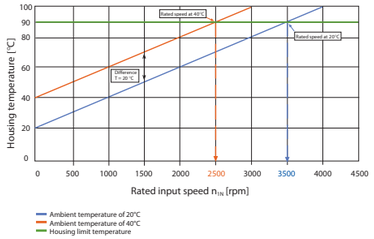
Ratio (i)

The gear ratio i indicates the factor by which the gearhead transforms the three relevant parameters of motion (speed, torque and mass moment of inertia).
The factor is a result of the geometry of the gearing elements (Example: i = 10).



Speed (n)

Two speeds are of relevance when dimensioning a gearhead: the maximum speed and the nominal speed at the input. The maximum permissible speed n_{1Max} must not be exceeded because it serves as the basis for dimensioning → **cyclic operation**. The nominal speed n_{1N} must not be exceeded in → **continuous operation**.
The housing temperature limits the nominal speed, which must not exceed 90 °C. The nominal input speed specified in the catalogue applies to an ambient temperature of 20 °C. As can be seen in the diagram below, the temperature limit is reached more quickly in the presence of an elevated outside temperature. In other words, the nominal input speed must be reduced if the ambient temperature is high. The values applicable to your gearhead are available from WITTENSTEIN alpha on request.



Synchronization error

The synchronization error is equal to the variations in speed measured between the input and output during one revolution of the output shaft. The error is caused by manufacturing tolerances and results in minute angular deviations and fluctuations in ratio.

Technical data

The technical data relating to our products can be downloaded from our homepage. Alternatively, you can send your requests, suggestions and comments to the address below.

Tilting moment (M_{2K})

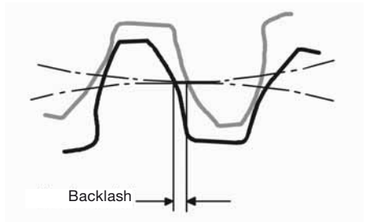
The tilting torque M_{2K} is a result of the → **axial and lateral forces** applied and their respective points of application in relation to the inner radial bearing on the output side.

Torque (M)

The torque is the actual driving force of a rotary motion. It is the product of lever arm and force. $M = F \cdot l$

Torsional backlash (j_t)

Torsional backlash j_t is the maximum angle of torsion of the output shaft in relation to the input. Torsional backlash is measured with the input shaft locked. The output is then loaded with a defined test torque in order to overcome the internal gearhead friction. The main factor affecting torsional backlash is the face clearance between the gear teeth. The low torsional backlash of WITTENSTEIN alpha gearheads is due to their high manufacturing accuracy and the specific combination of gear wheels.



Torsional rigidity (C_{t21})

Torsional rigidity [Nm/arcmin] C_{t21} is defined as the quotient of applied torque and generated torsion angle ($C_{t21} = \Delta T / \Delta\varphi$). It consequently shows the torque required to turn the output shaft by one angular minute. The torsional rigidity can be determined from the → **hysteresis curve**. Only the area between 50 % and 100 % of T_{2B} is considered for because this area of the curve profile can be considered linear.

WITTENSTEIN alpha speedline®

If required, we can deliver a new SP+,TP+ or LP+ within 24 or 48 hours ex works.

→ Refer to this term for further details.

Formulae

Torque [Nm]	$T = J \cdot \alpha$	J = Mass moment of inertia [kgm²] α = An [1/s²]
Torque [Nm]	$T = F \cdot l$	F = Force [N] l = Lever, length [m]
Acceleration force [N]	$F_b = m \cdot a$	m = Mass [kg] a = Linear acceleration [m/s²]
Frictional force [N]	$F_{frict} = m \cdot g \cdot \mu$	g = Acceleration due to gravity 9.81 m/s² μ = Coefficient of friction
Angular velocity [1/s]	$\omega = 2 \cdot \pi \cdot n / 60$	n = Speed [rpm] π = PI = 3.14...
Linear velocity [m/s]	$v = \omega \cdot r$	v = Linear velocity [m/s] r = Radius [m]
Linear velocity [m/s] (spindle)	$v_{sp} = \omega \cdot h / (2 \cdot \pi)$	h = Screw pitch [m]
Linear acceleration [m/s²]	$a = v / t_b$	t_b = Acceleration time [s]
Angular acceleration [1/s²]	$\alpha = \omega / t_b$	
Pinion path [mm]	$s = m_n \cdot z \cdot \pi / \cos \beta$	m_n = Standard module [mm] z = Number of teeth [-] β = Inclination angle [°]

Conversion table

1 mm	= 0.039 in
1 Nm	= 8.85 in lb
1 kgcm²	= 8.85 x 10^{-4} in.lb.s²
1 N	= 0.225 lb_f
1 kg	= 2.21 lb_m

Symbols

Symbol	Unit	Designation
C	Nm/arcmin	Rigidity
ED	%, min	Duty cycle
F	N	Force
f_s	–	Load factor
f_t	–	Temperature factor
f_e	–	Factor for duty cycle
i	–	Ratio
j	arcmin	Backlash
J	kgm²	Moment of inertia
K1	Nm	Factor for bearing calculation
L	h	Service life
L_{PA}	dB(A)	Operating noise
m	kg	Mass
M	Nm	Torque
n	rpm	Speed
p	–	Exponent for bearing calculation
η	%	Efficiency
t	s	Time
T	Nm	Torque
v	m/min	Linear velocity
x	mm	Distance between lateral force and shaft collar
y	mm	Distance between axial force and center of gearhead
z	mm	Factor for bearing calculation
Z	1/h	Number of cycles

Index

Capital letter	Permissible values
Small letter	Actual values
1	Drive
2	Output
A/a	Axial
B/b	Acceleration
c	Constant
cym	cymex® values (load-related characteristic values)
d	Deceleration
e	Pause
h	Hours
K/k	Tilting
m	Mean
Max/max	Maximum
Mot	Motor
N	Nominal
Not/not	Emergency stop
0	No load
R/r	Radial
t	Torsional
T	Tangential

Order information

Gearhead type
TP 004 – TP 500
SP 060 – SP 240
TK+ 004 – TK+ 110
TPK+ 010 – TPK+ 110
SK+ 060 – SK+ 180
SPK+ 075 – SPK+ 180
HG+ 060 – HG+ 180

Type code
S = Standard
F = Food lubrication
G = Grease
W = Washdown (SP+, TP+, SK+, SPK+, TK+, TPK+, HG+)
B = Modular output combination (SK+, SPK+, TK+, TPK+, HG+)

Gearhead variations
M = Motor attachment gearhead

Gearhead model
A = High Torque (only TP+)
C = High Speed (only SP+)
F = Standard

Number of stages
1 = 1-stage
2 = 2-stage
3 = 3-stage

Ratios
See technical data sheets.

Output shape
0 = smooth shaft/flange (no hollow shaft)
1 = shaft with key
2 = involute to DIN 5480
3 = system output
4 = other
5 = Hollow shaft interface / Flanged hollow shaft (TK+)
6 = 2 hollow shaft interfaces (HG+)
(see technical data sheets)

Clamping hub bore hole diameter
(see technical data sheets and clamping hub diameter table)

Backlash
1 = Standard
0 = Reduced
(see technical data sheets)

x = Special model

* Order shrink discs separately, see section HG+

Gearhead type
LP 050 – LP 155
LPB 070 – LPB 120
LK 050 – LK 155
LPK 050 – LPK 155
CP 40 – CP 115

Gearhead variations
M = Motor attachment gearhead

Gearhead model
O = Standard

Number of stages
1 = 1-stage
2 = 2-stage
3 = 3-stage (LPK+)

Ratios
See technical data sheets.

Output shape
0 = smooth shaft (for LP+ and LPK+ models only; for LP+ smooth shaft available with reduced torsional backlash only)
1 = shaft with key
LPB+
1 = centering on output side
3 = centering on motor side
(see technical data sheets)

Clamping hub bore hole diameter
1 = Standard
(see technical data sheets)

Backlash
1 = Standard (not LP+ with smooth shaft)
0 = Reduced (LP+/LPB+ only)

x = Special model

Gearhead type
VDT = TP flange
VDH = hollow shaft
VDS = SP output

Distance between axes
050
063
080
100

Gearhead variations
M = Motor attachment gearhead

Gearhead model
F = Standard

Number of stages
1 = 1-stage

Ratios
See technical data sheets.

Output shape
0 = smooth shaft/flange (VDT, VDH, VDS)
1 = shaft with key (VDH, VDS)
2 = involute to DIN 5480 (VDS)
4 = other
(see technical data sheets)

Clamping hub bore hole diameter
3 = 19 mm (050)
4 = 28 mm (063)
5 = 35 mm (080)
7 = 48 mm (100)

Backlash
1 = Standard

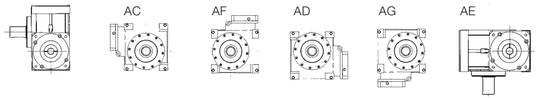
VDH – number of shrink discs
0 = no shrink disc
1 = one shrink disc
2 = two shrink discs

x = Special model

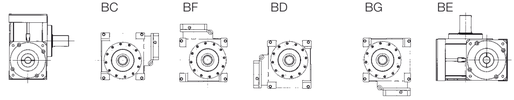
Mounting positions for V-DRIVE®

Mounting position (only relevant for oil volume)

Output side A:
View of motor interface
Only valid for VDS and VDT



Output side B:
View of motor interface
Only valid for VDS and VDT



With VDH, A and B must be replaced with an O.

Mounting positions for right-angle gearheads

For information purposes only – not required when placing orders!

Permitted standard mounting positions for right-angle gearheads (see illustrations)

If the mounting position is different, contact WITTENSTEIN alpha

B5/V3
Output shaft, horizontal
Motor shaft upwards

B5/V1
Output shaft, horizontal
Motor shaft downwards

V1/B5
Output shaft, vertical
Motor shaft, horizontal

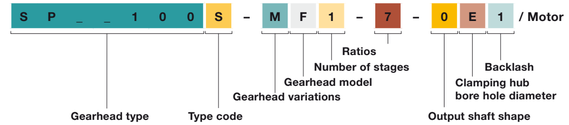
V3/B5
Output shaft, vertical, upwards
Motor shaft, horizontal

B5/B5
Output shaft, horizontal
Motor shaft, horizontal

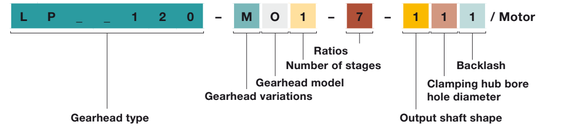
Order codes

WITTENSTEIN

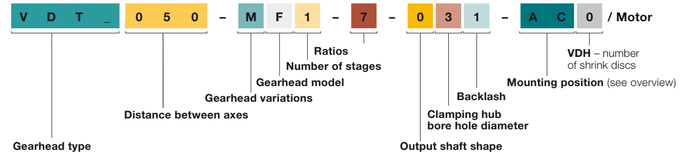
TP+/SP+/TK+/TPK+/SK+/SPK+/HG+



LP+/LPB+/LK+/LPK+/alphira (CP)



V-DRIVE®



Mounting positions for coaxial gearheads

For information purposes only not required when placing orders!

B5 – horizontal

V1 – vertical
Output shaft downwards

V3 – vertical
Output shaft upwards

S – can be tilted ±90° from a horizontal position

Clamping hub diameter

(the technical data sheet contains all diameters available for TP+, SP+, TK+,TPK+, SK+, SPK+ and HG+ models)

Code letter	mm	Code letter	mm
B	11	I	32
C	14	K	38
D	16	L	42
E	19	M	48
G	24	N	55
H	28	O	60

Intermediate diameters possible in combination with a bushing with a minimum thickness of 1 mm.

Order information

Rack and assembly jig

Rack type
ZST = Rack
ZMT = Assembly jig

Module
200 = 2.00
300 = 3.00
400 = 4.00
500 = 5.00
600 = 6.00

Version
PA5 = Premium Class
SB6 = Smart Class
VB6 = Value Class
PD5 = Assembly jig

Length
100 = Assembly jig (module 2 – 3)
156 = Assembly jig (module 4 – 6)
480 = Smart Class (module 2 – 4)
167/333 = Premium Class (module 2)
250 = Premium Class (module 3)
500 = Premium Class (module 2 – 6)
1000 = Value Class (module 2 – 6)

Premium Class* and Value Class pinion

Designation
RMT = Pinion mounted ex works
RMX = Pinion mounted offset 180°
(for VC pinions only)

Module
200 = 2.00
300 = 3.00
400 = 4.00
500 = 5.00
600 = 6.00

Version
PC5 = Premium Class
VC6 = Value Class

Number of teeth
(see technical data sheet)

Premium Class RTP and Standard Class RSP pinions

Designation
RSP = Standard Class RSP pinion for SP
Involute output as per DIN 5480
RTP = Premium Class RTP pinion for TP output
RTPA = Premium Class RTP pinion for TP High Torque output

Gearhead size
For SP output:
060, 075, 100, 140, 180, 210, 240
For TP output:
004, 010, 025, 050, 110, 300, 500
(see technical data sheets)

Module
A02 = 2.00
A03 = 3.00
A04 = 4.00
A05 = 5.00
A06 = 6.00

Tolerance class
5e24 = Premium Class RTP/ RTPA
6e25 = Standard Class RSP

Number of teeth
(see technical data sheet)

Torque limiter and bellows coupling

Model
Torque limiter
TL1 / TL 2 / TL3
Bellows coupling
BC2 / BC3 / BCT / EC2

Series – Nominal torque
(see technical data sheets)

Length options
A = first series
B = second series only for TL2 / TL3 / BC2 / BC3 and EC

Version
Torque limiter
W = Single position re-engagement (standard version)
D = Multi-position
G = Load holding
F = Full disengagement
X = Special
Bellows coupling
A = standard

Internal diameter D_1^{H7}
TL1: D = D_1 = D_2
(for miniature version, 1.5 –10 Nm)

Internal diameter version D_1
0 = smooth shaft
1 = with key to DIN 6885 Shape A
2 = Involute to DIN 5480
4 = Other (specific for key)
5 = Key connection (TL1 only, type C)

Internal diameter D_2^{H7} Hole circle diameter D_3 (BCT)
TL1: D = D_1 = D_2
(for miniature version, 1.5 – 10 Nm)

Internal diameter version D_2
0 = smooth shaft
1 = with key to DIN 6885 Shape A
2 = Involute to DIN 5480
4 = Other (specific for key)
5 = Key connection (TL1 only, type C)

Adjustment range
(only for TL1 /TL2 /TL3)
A = first series
B = second series
C = third series

Disengagement torque
(only for TL1 / TL2 / TL3)

Order codes

ZST_200 – PA5 – 500
Rack type | Module | Version | Length

Premium Class* and Value Class pinion

RMT_200 – VC6 – 18
Designation | Module | Version | Number of teeth

Premium Class RTP and Standard Class RSP pinions

RTPA 025 – A02 – 5e24 – 040
Designation | Gearhead size | Module | Tolerance class | Number of teeth

Torque limiter and bellows couplings

TL1 – 00015 A W 1600 0 – 16000 0 – A0016
Model | Series | Length options | Version | Internal diameter D_1^{H7} | Drive, internal diameter version | Internal diameter D_2^{H7} Hole circle diameter D_3 (BCT) | Drive, internal diameter version | Adjustment range | Disengagement torque

YOUR NOTE

WITTENSTEIN

WITTENSTEIN alpha GmbH
Walter-Wittenstein-Straße 1
97999 Igersheim
Germany

Switchboard: Tel. +49 7931 493-0
24h-Hotline: Tel. +49 7931 493-10900
speedline: Tel. +49 7931 493-10333 or 10444

www.wittenstein-alpha.de